THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXI. No. 2071.] LONDON, JANUARY 20, 1903. [55TH YEAR. PRICE 6d.

PARKER & LESTER,

— *ESTABLISHED 1830* —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

SAFETY GAS-MAIN STOPPER,

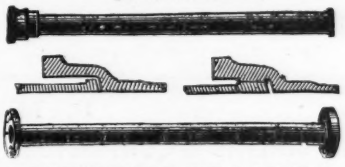
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

GAS AND WATER PIPES

1¼ to 12 in. BORE.



THOMAS ALLAN & SONS, LIMITED,

Bonlea Foundry,

THORNABY-ON-TEES.

Formerly Springbank Iron-Works, Glasgow.

ESTABLISHED 1848.

Also Manufacturers of

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

Telegrams: "BONLEA, THORNABY-ON-TEES."

CARLESS, CAPEL & LEONARD,

HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E.,

And at Pharos Works, Hackney Wick.

NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,

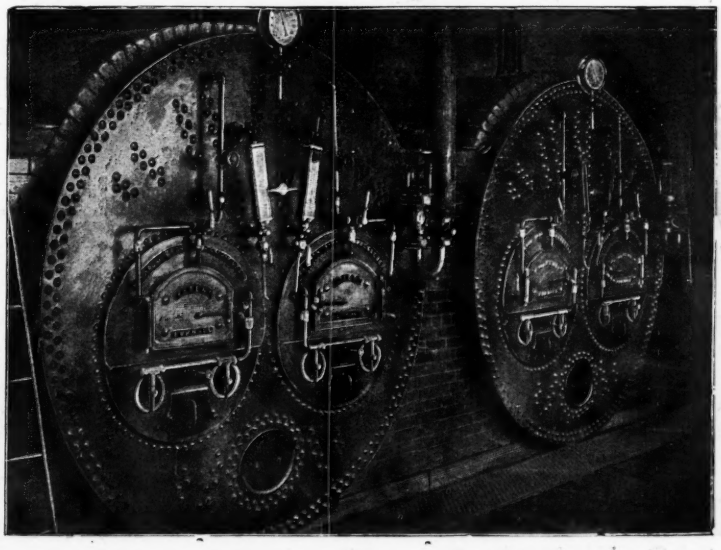
Specially distil Carburine Spirit, specific gravity ·680, or of any other grade suitable for Enriching Gas, also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.

Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthaline, &c.

Samples and Prices may be had on application.

THE "MELDRUM" BREEZE FURNACE.

More Steam.



Less Cost.

OVER

10,000

WORKING.

WRITE FOR CATALOGUE AND TESTIMONIALS.

SUITABLE FOR ALL KINDS OF BOILERS, AND ALL KINDS OF FUEL.

FOR FULL PARTICULARS, ETC., APPLY TO

MELDRUM BROS., LTD., Atlantic Works, MANCHESTER; & 66, VICTORIA ST., LONDON, S.W.

F. C. SUGDEN & Co.

CARBONIZING SPECIALISTS.

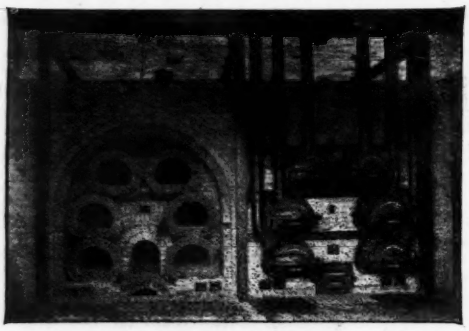


PHOTO. OF REGENERATOR SETTINGS DURING CONSTRUCTION.

REGENERATOR & GENERATOR SETTINGS

DEEP, SEMI-DEEP, AND SHALLOW.

Maximum Make per Ton and Mouthpiece.

Minimum Fuel Consumption.

NUMEROUS REPEAT ORDERS

Have been received for each of the above types of settings.

RESULTS GUARANTEED. RETORTS RESET.

SOLE MAKERS OF **CRIPPS' PATENT CHIMNEY.**

Designs and Estimates on application. **28, EAST PARADE, LEEDS.**

PATENT ADJUSTABLE OVERFLOWS.

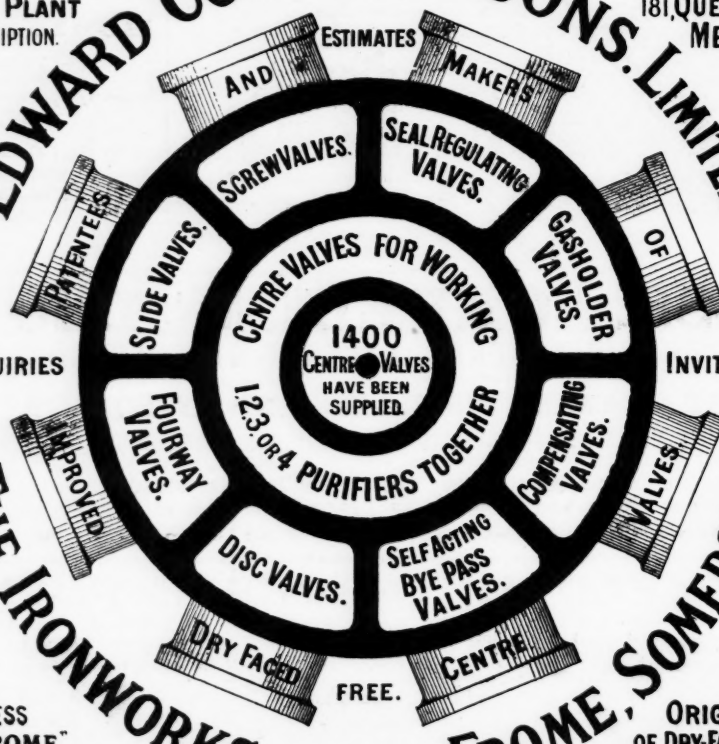
ENGINEERS & CONTRACTORS FOR GAS WORKS PLANT OF EVERY DESCRIPTION.

EDWARD COCKEY AND SONS, LIMITED.

LONDON OFFICE: BRIDGE HOUSE 181, QUEEN VICTORIA ST. E.C. MESSRS BALE & HARDY, AGENTS.

PATENT WASHERS

PATENT COMBINED BYE-PASS & COMPENSATOR FOR EXHAUSTERS.



ENQUIRIES INVITED.

FREE.

TELEGRAPHIC ADDRESS "COCKEYS FROME" "DAMPER LONDON"

THE IRONWORKS FROME, SOMERSET.

ORIGINAL MAKERS OF DRY-FACED CENTRE VALVES. ESTABLISHED OVER HALF A CENTURY.

PATENT FIRE DOORS & FRAMES.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

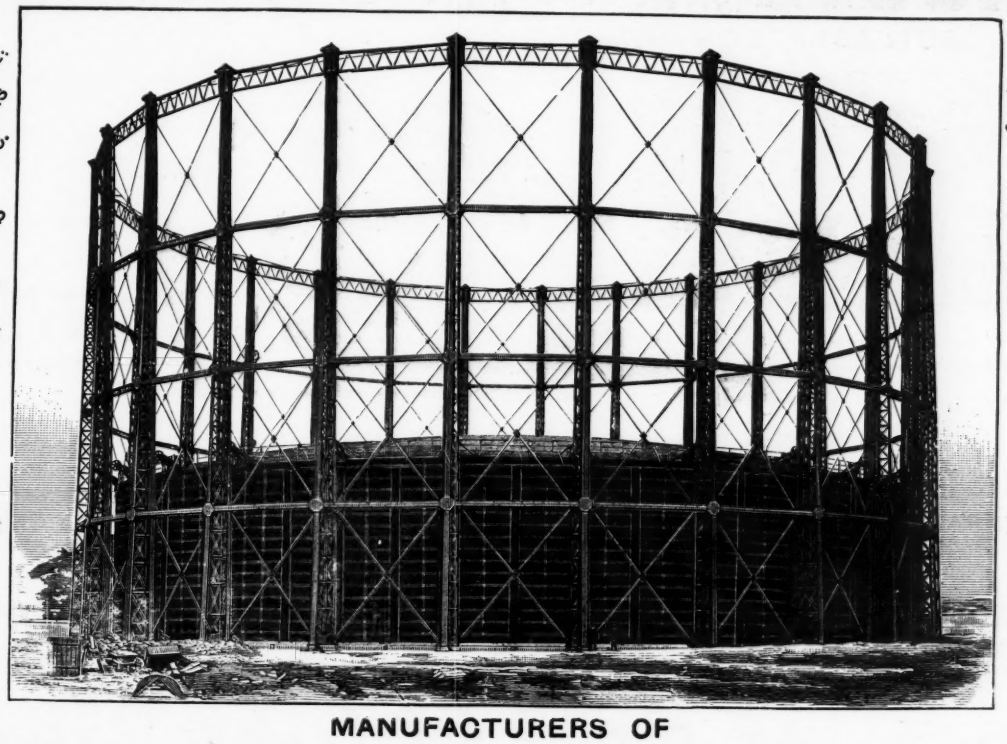
SCREWING TACKLE. BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. **MANCHESTER:** 33, King Street West. **BIRMINGHAM:** 114, Colmore Row. **LEEDS:** 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS
BOILERS,
ENGINES.
PUMPS.
ROOFS.
RETORT.
FITTINGS.
ETC.



TELEGRAPHIC ADDRESS: ATLAS, BIRMINGHAM.

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

MANUFACTURERS OF

Humphreys & Glasgow's Patent Carburetted Water-Gas Plant.

INSTALLATIONS HAVE ALREADY BEEN ADOPTED WITH AN AGGREGATE CAPACITY OF **131,725,000** CUB. FT. DAILY.

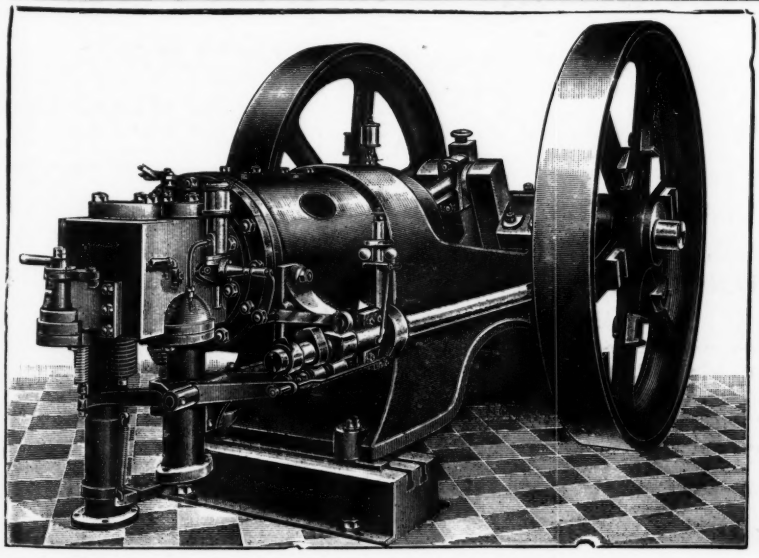
HARRIS & PEARSON,

STOURBRIDGE, ENGLAND,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.



From Photo. of our P. ENGINE. 65-Brake Horse Power, on Test Blocks

LARGELY ADOPTED BY GAS ENGINEERS.

Prices, Catalogues, and Testimonials on Application.

TELEGRAPHIC ADDRESS: "MOTIVE, BIRMINGHAM."

WILLIAM GRICE & SONS,

ENGINEERS, LTD.,

BIRMINGHAM.

London Office: 25, Victoria St., Westminster.

MR. A. B. COOTE, REPRESENTATIVE.

Sole Manufacturers of

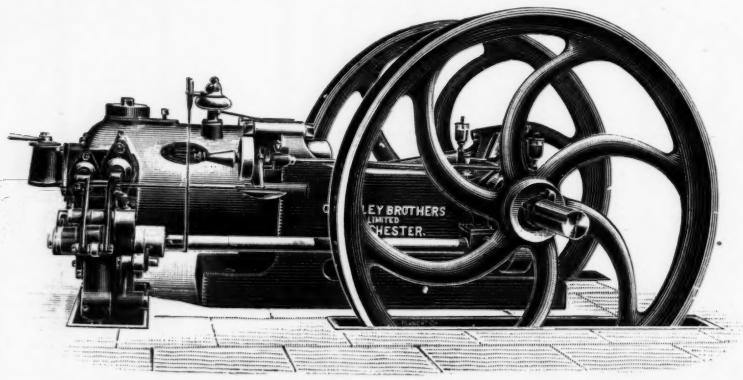
'Grice's' Gas-Engines

City of Birmingham Gas Department
(Mr. HENRY HACK, Engineer),
Have 1 ENGINE, 40 B.H.P.
1 .. .. 34 ,,
1 .. .. 26 ,,
1 .. .. 22 ,,
1 .. .. 20 ,,
2 .. each 16 ,,

Edinburgh & Leith Gas Commissioners
(Mr. W. R. HERRING, Engineer),
Have 2 ENGINES, each 125 B.H.P
1 .. .. .. 26 ,
2 .. .. ,, 16 ,
At work and on order.

CROSSLEY'S GAS-ENGINES

SUITABLE FOR DRIVING EXHAUSTERS, PUMPS, &c.



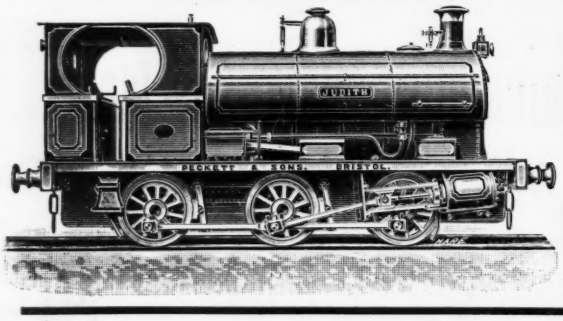
Represents "XA" Type giving 60 Effective Horse Power.

ENGINES DELIVERED.—Up to the end of 1901, 42,873 Engines have been delivered representing 595,969 B. HP.

IMMEDIATE DELIVERY FOR STOCK SIZES OF ENGINES.

Large Number of Second-Hand Engines always in Stock.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT, BRISTOL."

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: **19, Great George Street, WESTMINSTER.**

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS, RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS. IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS AND ELEVATORS, CONDENSERS, SCRUBBERS, AND WASHERS.

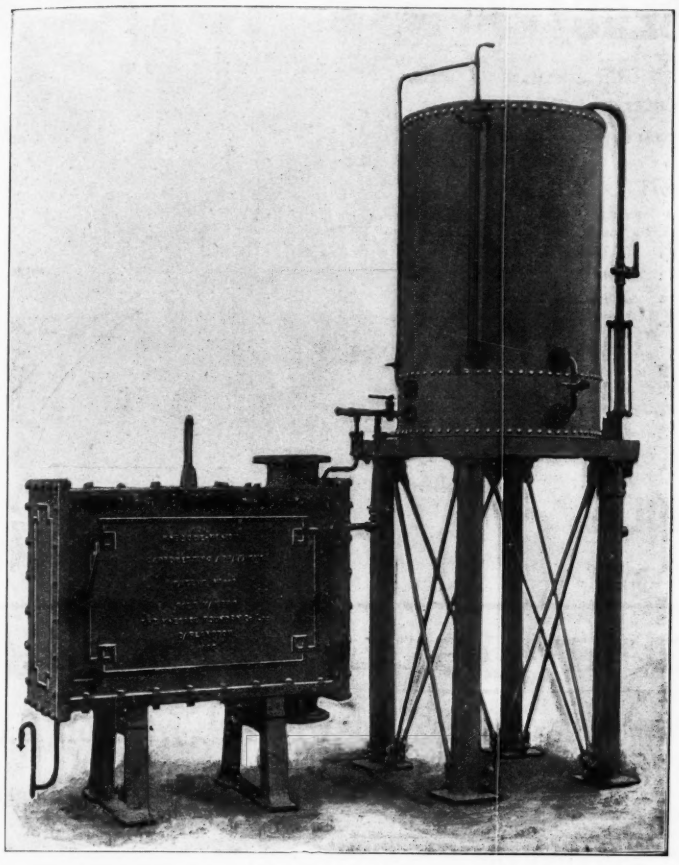
PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS, AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS. STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING. GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its unrivalled excellence.

"WHESSOE-MUNICH" BENZOL CARBURETTING APPARATUS.



Working at Tynemouth, Middlesbrough, Darlington, Bilston, West Bromwich, South Shields, and many Continental Gas-Works.

Cheapest and most Effective Plant.

Permanent Enrichment obtained Instantaneously.

Sole Makers—

THE **WHESSOE**

FOUNDRY CO., LTD.,

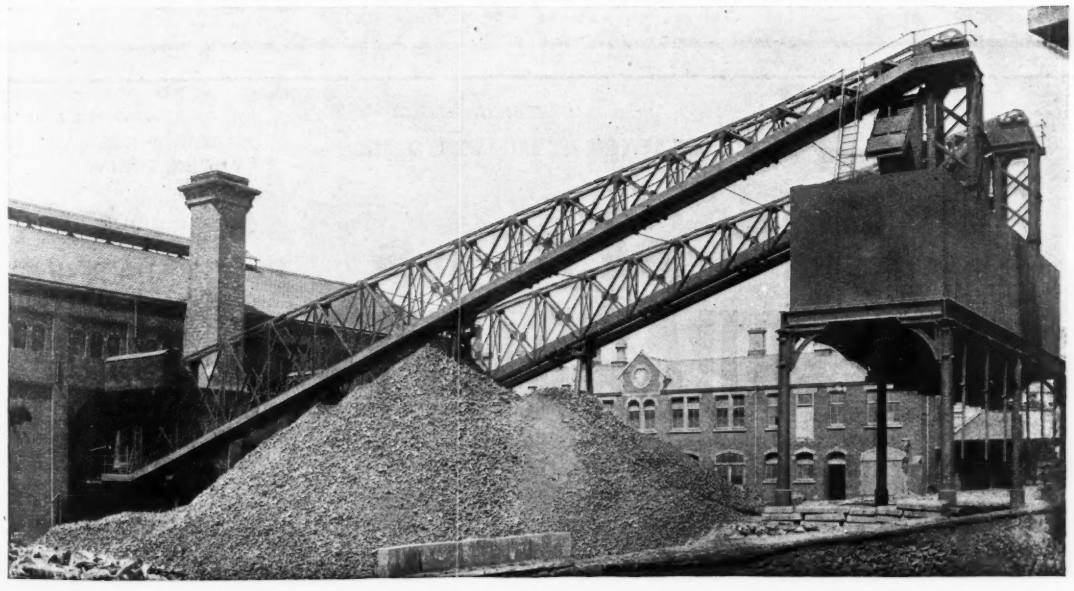
Works: **DARLINGTON.**

London Office: **106, CANNON STREET, E.C.**

THE

DE BROUWER PATENT HOT COKE CONVEYOR

GUARANTEED BY SOLE MAKERS.



W. J. JENKINS & Co., LIMITED. RETFORD.

PATENT

"STANDARD" CONDENSERS

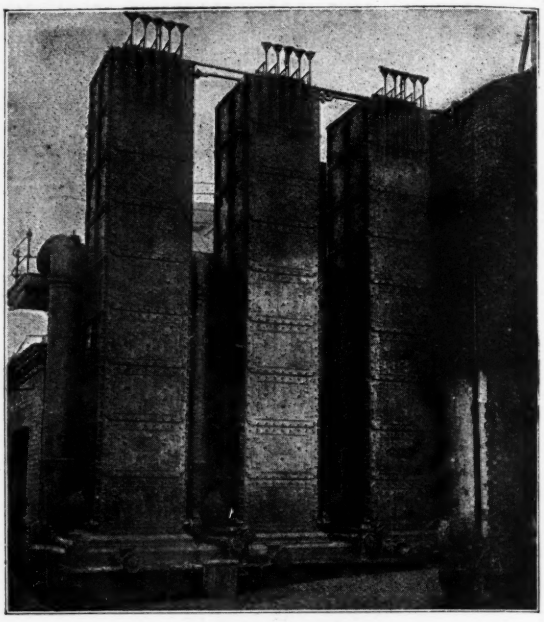
ADVANTAGES:—

Slow Speed. Large Area for Gas and Water.

Easy access to Interior. Capacity easily increased, &c.

IN USE OR IN COURSE OF CONSTRUCTION:—

	Capacity Cub. Ft. per day.		Capacity Cub. Ft. per day.
GLASGOW	12,000,000	ALDERSHOT	500,000
ANTWERP	2,500,000	RANDERS	500,000
COVENTRY	2,000,000	CETTE	400,000
COPENHAGEN	1,500,000	BARKING	300,000
BURY	1,000,000	PINNER	250,000
SUTTON	1,000,000	HERNE BAY	250,000
GLOUCESTER	1,000,000	PELTON COLLIERY	250,000
SCARBOROUGH	1,000,000	TUBORG	250,000
GUERNSEY	750,000	AALBORG	250,000



KIRKHAM, HULETT, & CHANDLER,

LIMITED

PALACE CHAMBERS, BRIDGE ST., WESTMINSTER, S.W.

STOKER'S GLOVES.

GEO. BOULTON & SON, Wholesale Glove Manufacturers, 292, Goswell Rd., London, E.C.

Late of 75, Goswell Road. Established 50 Years.

Will be pleased to send Sample Patterns and Prices to the Managers and Engineers of Gas Companies, similar to those which have been supplied by them to the South Metropolitan Gas Co., The Gaslight and Coke Co., Commercial Gas Co., and others.

ALL KINDS OF STOUT LEATHER GLOVES FOR FURNACE OR SMELTING WORKS MADE TO ORDER.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "PARKER, LONDON."

TELEPHONE NO.: 756 BANK, LONDON.

Contractors H.M. Government.

COMPLETE GAS AND WATER WORKS ERECTED.

TELEGRAPHIC ADDRESSES: "ROBUSTNESS, LONDON." "WATER, GORING."

FLOOR-LINE, INCLINES. **RETORTS** GENERATIVE. REGENERATIVE.

GUARANTEED

RETORT-HOUSES.
BORE-HOLES.
WELLS.
RESERVOIRS.
EVERY REQUISITE.

Mainlaying.

GASHOLDERS & TANKS.

J. & H. ROBUS,
GAS AND WATER ENGINEERS,
LONDON & GORING.
20, BUCKLERSBURY.

When Stocktaking

You can always

Value

"ACME"

Gas-Fires

As

Good

Stock.

ARDEN HILL & CO.,
BIRMINGHAM.

HISLOP'S RETORT SETTINGS

RESULTS GUARANTEED—ARE CERTIFIED

TO EXCEED THAT OF ANY OTHER SYSTEM.

DRAWINGS AND ESTIMATES FURNISHED ON APPLICATION TO

R. & G. HISLOP, *Gas Engineers and Contractors,*

13, ST. JAMES PLACE, **PAISLEY.**

HENRY BALFOUR & CO.

LIMITED,

LEVEN, FIFESHIRE.

Contractors for the Supply and Erection of all Classes of

Gas-Works Plant.

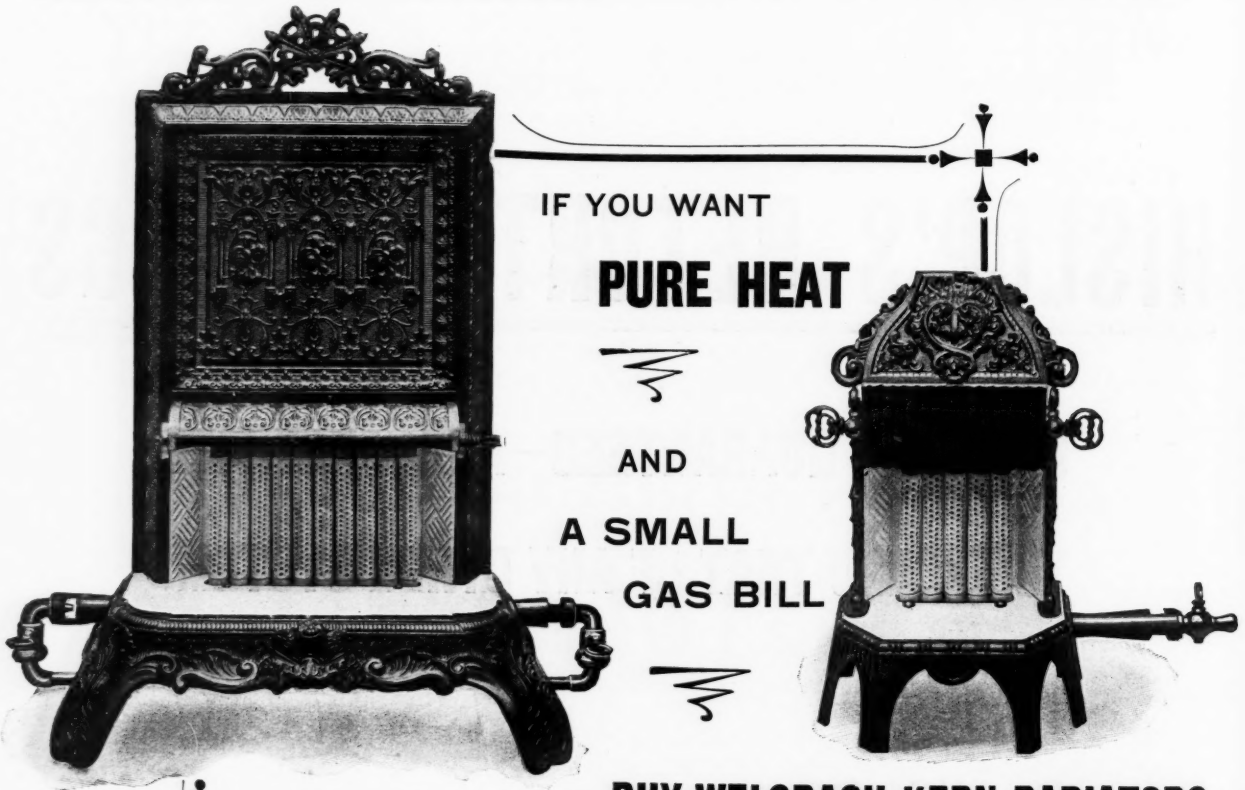
THE "ANNULAR" BRUSH WASHER-SCRUBBER

(CREEKE'S PATENT).

Made with Cast-Iron or Mild Steel Cylinders.

PRICES AND PARTICULARS ON APPLICATION.

London Representative: **MR. HENRY PUPLETT, 47, VICTORIA STREET, S.W.**



BUY WELSBACH KERN RADIATORS.

JOHN HARPER & CO., LIMITED, ALBION WORKS, WILLENHALL, ENGLAND.
LONDON SHOW-ROOMS: 4, NEW UNION STREET, MOORFIELDS, E.C.

CONTENTS.

EDITORIAL NOTES.

GAS, LIGHTING, &c.—
The Honorary Membership of the Institution 143
The Shortage of Coal in America and the Coal Outlook at Home 144
Sir George Livesey Speaks his Mind to the London County Council 145
The Gas Undertakings Returns 145
The Denaby Strike in the Law Courts . . 145
The American Coal Famine 146
Changes in Italy 146
The Gaslight and Coke Company's Dividend—The Discovery of the Successful Welsbach Mantle—Incandescent Mantle Combinations: An Increase in the Price of Thorium — A Warning Regarding Notices of Dismissal—An Official Receiver and a Hiring Agreement—Market Position of Sulphate of Ammonia. . . 147

WATER AFFAIRS—
The Teachings of Rainfall Records . . . 148
Profitable Utilization of Watershed Areas. 148

ESSAYS AND REVIEWS.

The Granton Works of the Edinburgh and Leith Gas Commissioners 149
Gas and Water Precedents 151
Gas and Water Stock Market 151
An English Inclined Retort Installation in Italy 152
Gas Undertakings Returns 157
Gas Bills for 1903 158
Trade in 1902 159
Municipal Trading and Local Rates . . . 160
Electric Lighting Memoranda 161
Changing London and its Effect on Gas and Electricity Supply 162

COMMUNICATED ARTICLE.

Some Experiences with Water Gas. By Harold E. Copp. 163

TECHNICAL RECORD.

The Gas Industry and the Manufacture of Cyanide 164

CORRESPONDENCE.

The Honorary Membership of the Institution of Gas Engineers 165
Inclined *v.* Horizontal Retorts 165
Notable Experiences with Blue Water Gas at Ilford 166
Clips for Meter Connections. 166
Dr. Kramers' Water-Gas Apparatus . . . 166
"A Ray of Light" and its Electrical Critics. 166

LEGAL INTELLIGENCE.

High Court of Justice—King's Bench Division—T. Bray *v.* Sheffield United Gaslight Company 167
The Testing of Gas on Sundays 167
The Claim in the Austrian Law Courts against Baron Auer von Welsbach—The Judgment 168
Gas-Mains and Tramway Lines at Ilford. . 168
Wrongful Removal of a Gas-Engine on Hire. 168

MISCELLANEOUS NEWS.

London County Council and the Gas Companies—Letter by Sir George Livesey on Sunday Gas Testing, &c. 168
Sulphate of Ammonia Market Last Year . . 170
The Gas-Works Purchase Question at Wellington (Salop) 171

MISCELLANEOUS NEWS (*continued*)—
Railway Accident at a Gas-Works 171
Electric Lighting Notes 172
Stock and Share List 172
Notes from Scotland 174
Current Sales of Gas Products 176
Coal Trade Reports 177

PARAGRAPHS.

The Law Relating to the Pollution of Rivers —Artesian Wells in London—Luminous Paint 159
The Work of the Standards Department—The Somzée-Greyson Incandescent Gas-Burner Patents 162
Personal and Obituary 163
The Beaumont Oilfield—Danish Portland Cement 163
The Heard Fund—The Metropolis Water Act, 1902, Epitomized—Adoption of the Lacarriere Burner at Dijon—Statistics of Dutch Gas-Works for 1899 and 1900. 164
The Garw and Ogmore Gas Company—Sales of Shares 176
Gas Workers in the Provinces—The Fatal Explosion at Strasburg—Gorleston and Southtown Gas Bill—Gas and Water Profits at Chesterfield 177
Westhoughton District Council and the Gas-Works—German Coal for the Paris Gas Company—American Capitalists and the Paris Gas Supply — Prepayment Meter Gas Supply at Southport—Gas-Works Extensions at Colwyn Bay—Family Overcome by Gas at Swansea—Opposition to the Hexham Gas Bill—Incandescent Gas *v.* Electric Lighting for Machine-Shops 178
Extensions at Staines 179

Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

CARBURETTED WATER-GAS PLANT

— *DOUBLE SUPERHEATER SYSTEM.* —

H. & G., LONDON **131,725,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **317,925,000** Cu. Ft. Daily

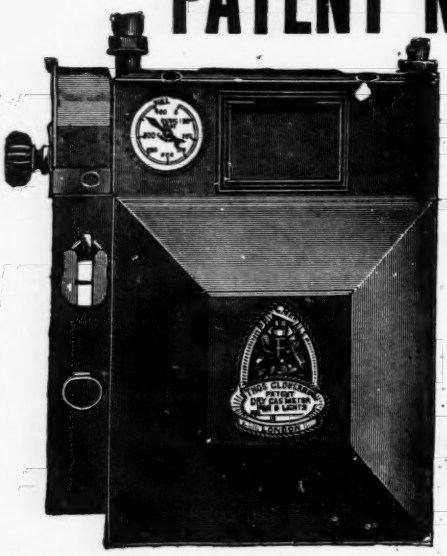
TOTAL 449,650,000 Cu. Ft. Daily

Messrs. HUMPHREYS & GLASGOW,
38, Victoria Street, London, S.W.
31, Nassau Street, New York.

THE UNITED GAS IMPROVEMENT COMPANY,
Philadelphia.

Telegrams: {"EPISTOLARY, LONDON."
"HUMGLAS, NEW YORK."

THOMAS GLOVER & CO.'S PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

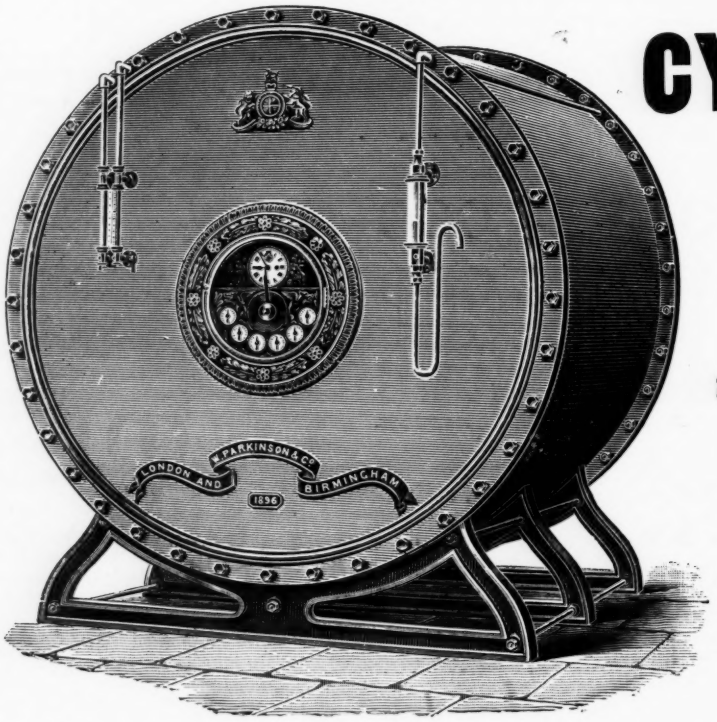
GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.
Telegraphic Address: "GOTHIC, LONDON. Telephone No. 725 Holborn.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:
28, BATH STREET.	57 & 58, BROAD STREET,	37, BLACKFRIARS STREET.	26, WEST NILE STREET.
Telegraphic Address: "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GASMAIN."
Telephone No. 1005.		Telephone No. 3898.	Telephone No.: 6107 Royal.

PARKINSON'S CYLINDRICAL METERS



Some have been in constant use for over **60** Years.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXI., No. 2071.—TUESDAY, JANUARY 20, 1903.

EDITORIAL NOTES.

The Honorary Membership of the Institution.

PERHAPS the greatest surprise that the "JOURNAL" contained last week for the majority of readers was found in the letter of Mr. J. W. Helps, the Honorary Secretary of the Institution of Gas Engineers. The communication came too late for editorial reference in that issue; but under all the circumstances, it is better that it was so, as the interval enables us to deal with a fuller knowledge of the facts that resulted in the election to honorary membership of only two gentlemen who come under the descriptive title of "traders." The successful candidates for the honour are Mr. John West and Mr. Thomas Duxbury. As to their qualification for the dignity conferred upon them, there can be no question; and their very names acquit us of the necessity of enlarging upon the manner in which they have exercised their natural gifts in the service, and for the benefit, of the gas industry. What they have done has gained for them the votes of a two-thirds majority of the Council, whose very proper opinion is that they have "rendered distinguished services to the profession of gas engineers," and have "specially promoted the interests of the gas industry." The reason the names of the two honorary members were not disclosed in Mr. Helps's letter was, we have good ground for believing, that the Council practically decided the terms in which the announcement should be made. It is a small matter; but if the Council deliberately determined that the names should be withheld, we fail to discover the wisdom that directed them. Secrecy in such a matter is puerile; and it could not possibly be maintained for very many hours. Nothing has been gained by the course adopted; but, on the contrary, the point is one that could be easily inflamed by the captious. Particularly at the present moment, there should be a studious avoidance of anything—insignificant though it be—which is likely to provoke irritation.

However, the smallness of the election to honorary membership has caused astonishment, and little wonder seeing that rumour, conversation, and the number of the old Institute members on the amalgamated Council had raised the expectation of a result of a totally different character. But expectation has not been realized; and for this, if the Articles of Association were honestly intended to govern and direct the Council, we are in a position to emphatically declare no blame can attach to the latter. If those members in any class of the old societies who were made, by clause 4 of the Memorandum of Association, ineligible for a like status in the new organization, but who came under the terms and requirements of Section II. of Article 5, neglected to make application for honorary membership within the specified period—that is to say, before Dec. 12—then it was impossible for the Council to include them in the ballot. As a matter of fact, somewhat less than half the members and associates of the old societies who are engaged in trade, and thus ineligible under Article 4, applied for honorary membership; and consequently only those who did apply could be dealt with by the ballot of the Council. By far the greater part of those among the old trading members who can be described, in the words of Section II. of Article 5, as having "rendered distinguished services to 'the profession of gas engineers," or have "specially promoted the interests of the gas industry" refrained from applying for admission to the Institution as honorary members; otherwise the list of those who succeeded in gaining the suffrage of a two-thirds majority of the Council would have presented a far different appearance. As can be well imagined, applications were pretty generally received from those who, if the Council were intended to act seriously and honourably under the power with which they were vested, had really no claim to their consideration; and remembering the constitution of the amalgamated Council, most men, we venture to think, will, with the issue before them, accept without question the purity and uprightness of their action in the matter. The rules passed unanimously by the members for the guidance of the Council were determinate; and their generosity could not exceed the defined scope. Any departure would have been a transgression of duty, trust, and authority. That being so, we shall be curious to see who, if anyone, among the members will be the first to announce himself as opposed to law and order by challenging the verdict of the thirty men to whom they confided a very delicate task. For our own part, we should want to see the list of men who presented themselves for election, before daring to impeach a verdict given under such conditions. It may be thought by some that the result of the ballot was influenced by the letter from Sir George Livesey which appeared in the "JOURNAL" for the 30th ult.; but that is not so. It is now known that, before the day the letter was published, the ballot-lists had been already lodged with the Secretary of the Institution; so that, while the gist of the letter, that there should be no violation of the rule which governs admission to the Roll of Honour, has been realized, it could not, through the lateness of its publication, have had any possible effect in bringing about the present regrettable result—regrettable in that there should have been only two out of the number eligible to honorary membership who thought fit to make the necessary application.

It does not require much puzzling of the brains to discover a motive for the reticence in the matter of application of those who were entitled, by their accomplishments and work, to election to the dignity of honorary membership—"dignity" if the title was to represent something more than a nominal distinction. But it had been freely bruited abroad that the Council were going to put a liberal interpretation on the power with which the members had clothed them; so liberal, in fact, that it was by some fondly imagined that the Council were going to welcome with open arms all applicants on Form A for the honorary position. This egregious error seems to have obtained credence by the gradual mangling out beyond recognition of the remarks that were made by Mr. H. E. Jones, at the meeting of the Institution on April 30 last. He advised that the proposed honorary membership (the suggestion was Mr. Jones's) should not be made "too limited or narrow." But in his preceding remarks, he discriminated the class of commercial gentlemen to whom he specially referred as those who "combined both brains and goods." Superficially this does not appear to be complimentary to those who are traders and traders only. But Mr. Jones is not always given to subtilty of expression; and his bare words as quoted must not be taken too literally. To see exactly what he meant, the context must also be considered. "We are all aware," he added, "that this class comprehends men of the highest "scientific attainments;" and further on in his speech, he pointed out that the creation of such a class as he indicated would induce a "legitimate aspiration and ambition" on the part of traders to qualify themselves for membership. Reading Mr. Jones's speech as he intended it to be understood, we fail to see that he gave any ground for the hope that the acceptance of his suggestion of a way out of the supreme difficulty to amalgamation meant the creation of a paradise for those who, in respect of technical qualification, have no claim whatever upon an associated body of professional men.

Still the fact remains that the idea did get abroad that that was what was going to happen; and it can be well understood that the prospect of a wholesale admission would lead those men who, according to the terms of Article 5, were eminently fitted for honorary membership to regard their classification as anything but a dignified one; hence their preference for standing aloof. We do not write thus out of any disrespect for those whose attainments and work are not of that specialized order which would justify their admission into what is a scientific and technical organization, and not a trading institution. But it is not too late to repair the omission of the qualified non-applicants, and in a way which will do them great honour. The way is not the one suggested by Mr. Jones in his letter in the "JOURNAL" for the 6th inst. That, with all deference, we submit is closed

for ever by the time-limitation imposed by Article 5. But thereafter, under Article 24, the Council have the power to propose honorary members at the annual general meeting of the Institution; and the approval of two-thirds of the members present will confirm the proposed honour. Under this article, there is certain to be a substantial increase in honorary membership before many months have passed.

In writing as we have done, we are not assuming the *rôle* of apologists for the Council. They need no defence from us. Our only object has been to explain the position so far as our knowledge goes in order to avoid unnecessary contention and friction—feeling that the result of the reference to those who are the elected arbiters of the members of the two old societies in this particular matter is a proof that they have honourably carried out the duty entrusted to them under Section II. of Article 5. Any questioning of their decision will simply mean that those who question do not understand the plain wording of their own articles. If those who were entitled by possession of qualification to honorary membership did not apply through a misconception of the intentions of the Council, that is not the fault of the Council; and the present modest representation of the honorary membership is, we shall feel satisfied (unless and until evidence which will carry conviction in the other direction is forthcoming), a matter over which, in the conscientious discharge of their duty, they had no control. It shows their desire to keep the honorary membership honorary in fact as well as in name. The shortness of the representation, and the absence of men whom we should be sorry to miss from the Institution, are matters which can be easily rectified under Article 24; and so far as those are concerned who have been unsuccessful in meeting the requirements of the governing rule, we can only hope that it will be their "aspiration and ambition" to so qualify themselves that hereafter their names may be found on the roll of those who have rendered signal service to the profession of gas engineers or have specially promoted the interests of the gas industry. That surely will be an honour quite worth working for.

The Shortage of Coal in America and the Coal Outlook at Home.

THE telegrams from the United States published in the newspapers during the past week show that, as was to be anticipated, the effects of the strike of coal miners which came to an end in October are being felt most severely long after the actual cessation of the struggle. We remarked at the time that its disturbing influence must be reckoned with right through the winter; and it would have been strange if this had not been the case, seeing that the commencement of the cold season found the States devoid of the usual stocks of coal, both as regards colliery stocks and the stores of consumers, industrial and domestic alike—at a time, moreover, when, in spite of the pressing demand for iron and steel, many factories and furnaces had been obliged to shut down for want of fuel. A shortage of coal in mid-winter was a certainty, and has accordingly come to pass. The situation described in the telegrams forcibly reminds us of the state of affairs in this country three years ago, though we did not, fortunately, come to the extreme "famine" condition which we are told subsists in some of the American towns, where the populace, "including leading business "men," are raiding the coal waggons, and distributing their contents at a price fixed by themselves. The gas-works are running perilously short of supplies, the steel-works in some places are working short time or closing, the poor are suffering from the severe cold combined with the dearness of fuel, and general inconvenience is being experienced. As a result, the import duty of about 2s. 9d. per ton on bituminous coal has been suspended for one year (anthracite was already on the free list), the miners are being urged by their leaders to augment the output as much as possible, and attempts are being made to arrange for a limited supply at moderate prices to the poorer classes.

Naturally, this state of affairs is having an appreciable influence on the coal trade of this country, just as the shortage of iron and steel in America is affecting the iron market here. As will be seen from a review of last year's trade which we publish in another column, our exports of coal to the States in 1902 were about 750,000 tons greater than in the preceding year—practically the whole of which increase took place in the last four months—while the net exports of iron and steel went up more than 600,000 tons compared with 1901, and more than 800,000 tons compared with 1900. Allowing for the increase in coal exports which are due to the absence from foreign markets of American supplies, the condition of trade in the States in the past year must have influenced the sales of British coal, for use at home and abroad, during that period by about four or five million tons, and is at the present moment increasing those sales at an even greater rate—probably not less than 500,000 tons per month. This quantity, while not representing quite 3 per cent. of our total output, is quite sufficient to turn the balance of the market in favour of the seller; and in his favour that balance certainly is at the present time. The question of prime interest is, therefore, how long it will be before the pendulum swings to the side of the buyer.

So far as the outlook abroad is concerned, the fact that the world's peace is, practically speaking, unbroken, is an element in the commercial position making for a steady volume of business; and all the indications point to the foreign trade of this country being well maintained during the present year. There should be a steady growth in our commerce with South Africa—where affairs are shaping themselves (or, ought we to say, are being shaped?) more favourably than some people feared would be the case—though the competition of Germany is not to be ignored; and there are reasons to hope that our trade with China, India, and Australasia will be well up to the average. There is not much ground for expecting any improvement in our exports to the Continent. In regard to the all-important question of America, it is not easy to foresee what the year will bring forth; but it appears certain that, for the first six months at any rate, the volume of the demand there will not materially diminish. The output of many of the iron furnaces is already sold for the whole of this period; and some buyers are making inquiries regarding the second half of the year. While, therefore, it must not be forgotten that the means of production are being steadily increased, and must eventually exceed the demand, and also that the gradual rise of prices (which have been, however, kept down wonderfully by reason of the wise policy of the Steel Corporation) must have its effect, ultimately, upon the demand, it is impossible to anticipate an early cessation of the influence at present exerted upon the British markets by the demand for coal, iron, and steel for shipment to the States.

With regard to the position of the home industries, apart from the effect upon them of foreign trade, the probabilities are that this year will be rather quiet than active, though no leading industry, except perhaps that of shipbuilding is at present seriously depressed. The percentage of Trade Unionists unemployed is higher now than for several years; but after allowing for the shipbuilding "slump"—the unemployed in that trade now number about 12 per cent., against 6 per cent. a year ago—the increase in the percentage of men out of work is not serious. The heavy taxation necessitated by the long struggle in South Africa, and the keen competition of German manufactures in the English markets—consequent upon the depression prevailing on the Continent—are influences making for dull trade; but the soundness of credit, the absence of any serious over-speculation during the past few years, and the anticipated remission of taxation next April, render acute depression in trade generally during 1903 an unlikely event. Two years ago such depression was apparently imminent and inevitable; but America has intervened, and graduated the decline in a remarkable fashion.

We do not, therefore, anticipate that the further fall in the price of coal which large consumers have every right to expect, and should leave no stone unturned to obtain (the current contracts for Durham gas coal are quite 2s. 6d. per ton above the level of five or six years ago), will take place in the earliest months of this year; and we most earnestly hope buyers will not bring about a still longer postponement of such relief to industry by any premature negotiation of contracts this spring. Time is on the side of the buyer. Every month brings the prospect of a break in the American markets nearer, and any month may see it arrive. There is, therefore, an urgent need for caution and wisdom on the part of those who have to negotiate the big gas coal contracts this year, which should be easier to arrange after Whitsuntide than before Easter. We need scarcely add that this review of the situation takes no account of labour difficulties, which it is hoped may be safely overcome.

Sir George Livesey Speaks his Mind to the London County Council.

It will be seen by our "Legal Intelligence" to-day that the matter of the action which is being taken by the London County Council to determine the question of the legality of Sunday gas testing has been mentioned in Court; and that, in default of any show of urgency, the trial will only come on in the ordinary course, which means some considerable delay. Meanwhile, Sir George Livesey, as Chairman of the South Metropolitan Gas Company, has taken the opportunity of addressing an "open letter" to the members of the County Council, which we reproduce in full. It will be found to be an eminently characteristic statement, peculiarly apt as regards the necessary operation of nailing the counterfeit coin of controversy to the counter. The "Journal" is implicated in the matter in no small degree, inasmuch as the present communication starts with the speech of Mr. W. C. Johnson in the Council on Nov. 18 last, which we reported, and an editorial comment on Mr. Ward's expression of opinion as to what the London Gas Companies would be likely to do if it were to be understood that gas was not to be tested on Sundays. Sir George Livesey asks the members of the Council, bluntly, what reason there is for thinking so badly of the Gas Companies as Messrs. Johnson and Ward confess they do, and in this respect possibly voice the opinion of the majority of their colleagues. He follows up the inquiry with a number of highly pertinent observations which would only suffer from paraphrasing, and must therefore be read in the original text.

It cannot be truly said that Sir George Livesey's representations in regard to the things that really matter in gas supply are novel. Indeed, to most of our gas engineering readers they must appear to be truisms. The central fact of the situation that has evoked them, however, is the sedulous attention always paid by the London County Council to the views of gas entertained by professors of chemistry and physics, who are apparently hopelessly incapable of comprehending the business and practical side of the subject. As Sir George pointedly says, if the Council administered the gas supply of the Metropolis themselves, they would have no more use for penalty gas testing, either on week days or Sundays, than any other gas-supplying local authority in the world—that is, none at all. The Council must know that no authority so situated can show any such reliance on testing and testers as they are led to profess to think necessary in the interests of the London population. But this is not the full measure of the artificiality of the Council's case. They also appear to believe that a 40s. fine is of greater weight with a London Gas Company than a regular loss of dividend amounting to a quarter-of-a-million pounds a year. This is officialism all over. Upon the personal portion of the letter it is unnecessary to offer any comment, except to express wonder at the singular tactlessness and crass ignorance of the character of the men they have to deal with that has been displayed by the County Council throughout their more recent dealings with the London Gas Companies. It is not only Sir George Livesey who has reason to protest against what appears to be the official view that every officer of a London Gas Company is a rogue at heart; but he is the last man to take such an imputation on his personal honour as all in the day's work.

The Gas Undertakings Returns.

The issue of the annual returns relating to the authorized gas undertakings in the United Kingdom, although a matter of the routine duty of the Board of Trade, never fails to arouse a ripple of interest in the minds of those whose business it is to follow the fortunes of the great national industry of gas supply. For one thing, the returns serve to show with indisputable authority how vast the industry is, and how very substantial is its growth from year to year. This evidence ought to specially appeal to those persons—and they are many—who do not know the relative scales of the operations of the gas and other industries which more or less compete with it in the service of the community. They hear so much more about electric lighting and electricity supply, for instance, and the current developments of this comparatively young rival of gas are made so interesting by the numerous able men who are perpetually speaking and writing on this class of subjects, that the great, strong, and growing flood of the gas industry flows by unnoticed. It comes with a considerable shock to this section of the public when some avowed partisan of electricity owns that as yet the enterprise carried on under the Electric Lighting Acts, so far from superseding gas, really does not materially interfere with the growth of its uses. The new returns happen to cover a complete period of twenty years—from 1882 to 1901 inclusive. The same period is included in the general electric lighting legislation of the country, which was called for in order that the new system of lighting and power supply might fulfil its destiny.

The broad result is that an aggregate authorized capital investment in gas which stood at £67,817,855 in 1882 amounted at the end of 1901 to £125,651,948. We have selected the figures relating to the authorized capital in order to lessen the disturbing effect of stock conversions, which, in the cases of so many of the larger gas companies, have assimilated their capital accounts to the actual value of the investment. The revenues of the gas undertakings of the kingdom for the last year of the returns amounted to £27,255,754, and the gross expenditure on revenue account to £22,168,653. Over 14 million tons of coal went to the manufacture of the gas sold, which exceeded 144,058 million cubic feet—a quite astronomical number, surpassing comprehension; and since upwards of 10 per cent. of this was carburetted water gas, a not inconsiderable proportion of the coke from the carbonization of the coal must have gone to this particular manufacture. The increase of demand for gas during the past twenty years is represented by the difference between 66,614 million cubic feet sold in 1882, and the consumption of 144,058 million cubic feet for the last year of the returns—say, 116 per cent. increase. And when it is remembered how much farther in lighting effect a cubic foot of gas goes now as compared with the duty commonly realized twenty years ago, this figure becomes still more significant. What will strike most people as remarkable is that, taking the two classes of undertakings together, the tale of public lamps lighted by gas continues to augment. Some slight falling off here might have been reasonably expected.

The amateur of municipalization will not be able to make very much out of these returns. He will find, it is true, that the process of conversion of gas undertakings to the use of the ratepayers has gone on rather more quickly of late years; but the profitableness of the business is not a very certain quantity. Curiously enough, the total of the net profit on municipal gas supplies last year was considerably less than it was in 1882, although the amount sunk in the business had doubled in the interval. It was about 1·6 per cent. on the outstanding capital, which does not strike one as a brilliant showing, if the business were carried on solely for the profits. Perhaps we may regard this result as a gratifying testimony to the gradual conversion of local authorities owning gas-works to the views as to the right conduct of this order of municipal undertakings, steadily upheld in the "Journal" throughout the period in question.

The Denaby Strike in the Law Courts.

The miserable Denaby Colliery strike, mentioned in this column last week, has come before the Law Courts on a kind of side-issue, which will probably be followed up with a direct action at the instance of the Colliery Company, on the lines of the Taff Vale case, against the Yorkshire Miners' Association. The last action was in the name of a member of the Association, which is a Trade Union registered under the Act of 1871, and the defendants were the Association and two of the officials. Its purpose was to restrain defendants from giving strike pay to the Denaby men, contrary to the rules of the Association, and to the detriment of the plaintiff, who did not join in the strike. It is provided by the rules of the Union, that in the event of the members having a dispute with their employers which cannot be settled by peaceable means, the men may cease work on giving the legal notice, and thereupon be entitled to strike pay out of the funds of the Association. As a matter of fact, the Denaby strikers did not observe the formality of giving notice, but struck summarily. Nevertheless, the Union gave them strike pay, after a stupid farce had been gone through, seemingly at the prompting of the Union Executive, with the object of making a pretence of giving notices at the colliery. Really, the Central Executive were warned that unless they fell in with the strikers' demands the men would "break away." It is the old story of the futility of

all paper regulations and prudential considerations at Union headquarters to control strikers. Of course, in the circumstances, the Miners' Union did as the Amalgamated Society of Railway Servants did at Taff Vale, when their hands were forced—they paid. The recent action was to ascertain whether a Trade Union can break its own rules with impunity, and defy its own members to restrain its illegal actions. The sole defence was that the action failed under the provision of the Act of 1871, which establishes the famous position that a Trade Union cannot sue or be sued. Nor did Counsel for the Union shrink from the logical conclusion put forward by the Judge, that, if this contention is sound, "members of the Union might see their funds being "squandered by the managers and have no remedy." This is one of the peculiar attractions of Trade Unions. In the event, the Judge granted the injunction asked for; and thus another blow was given to irresponsible Trade Unionism. An appeal against this decision was immediately entered, and is to be heard to-morrow, in view of Friday being the Association's pay-day.

The American Coal Famine.

THE British public have been harrowed, during the last few days of bitterly cold weather, with reports from New York of poor people perishing for lack of coal. Such statements relating to the Land of the Free constitute a strange commentary on the usual claims put forward for the excellent condition of all classes of citizens of the United States. If people are actually being frozen to death there, what is to be said for Western Civilization? If all accounts are true, the rule of civilized law and order in the northern and the eastern States of the Union has given place to the condition of primitive anarchy indicated by the proverbial declaration that "necessity knows no law." Something has gone very wrong with the "wheels within wheels" of American life. Who or what began it is not for us to inquire. Such an investigation might carry one right back to the Pilgrim Fathers, who were not renowned for their respect for natural laws. At any rate, last year there was a strike of coal miners in the anthracite region from which the main fuel supplies of New York and other close-stove using masses of the population are ordinarily obtained. The immediate result was a shortage of the supply during the season when the winter stores at the consuming centres should have been filled up. The winter came and found the people unprepared. Prices of coal on the spot advanced to famine figures. One hears of £10 being paid for a ton of anthracite. Of course, the poor—and for all that American apologists can urge there are people in New York as poverty-stricken as any town-dwellers in the world—could not buy coal at such cost. Retailers with coal to sell made amazing profits out of those who had the money; but in various tenement dwellings babies died "with tears frozen on their "cheeks," said the papers. It is not a pleasant subject to think about.

It is gratifying to learn from a reliable source that, as a rule, the gas companies in the frost-stricken towns have not raised the price of such coke as they had to sell, and have sold it only in small quantities in order to make it go as far as possible. At least one Company gave away their entire store of breeze, of some hundreds of tons, to a foraging army of the very poor. In the same city, car loads of coal disappeared from the railway yards and sidings; and trees growing in private grounds were cut down and taken away for burning in a night. Elsewhere, the civil authorities have recognized that the people must have fuel or perish. Train loads of coal have been "held up" and pillaged to the last lump in the presence of the local magistracy. The tariff on imports of coal is to be suspended for a year. But the mischief is that the ordinary channels of supply are congested. The coal required by New York is being raised in Pennsylvania, and coal from foreign ports may enter the harbour of New York without the poor consumer being able to get it. Upon the top of all this trouble, amounting to a breakdown of the machinery of supply and demand, there sits a new kind of spectre—that is, the bugbear of Trusts. The history of famine and privation in the world is a long one, and very various. People have had to go short of the necessaries of life at different times and for many reasons; but they have never done so willingly when responsibility for their sufferings could be placed upon persons or systems. In the present case, the American people seem to believe that the coal famine is a consequence of the existence of the Anthracite Trust; and if this belief is strongly held, whether it is well founded or not, the Trust system will have to go, even if it must be wiped out in blood. They are not of the breed to endure oppression tamely, when once their mind is made up in regard to the way to end it.

There has been much talk about Trusts lately, and quite recently Professor W. Smart, of Glasgow, lectured very agreeably on the subject at the Society of Arts. He was followed by Sir R. Giffen, who also spoke instructively on the same topic; but the weakness of all these academical surveys of the operation of Trusts of the American type is that they are detached from the experiences of the common person who pays. The consumer pays, and, as at present in the United States, suffers because he can either not pay enough, or cannot be satisfied even though willing to pay too much. He does not always know why this is so; but he does not like it, and has no intention of allowing it to continue. Sir R. Giffen said, quite truly, that the remedy for such troubles as the present coal famine of the United States is, in the first place, the abolition of the tariff—thus letting trade and industry take their natural course. The object of the tariff was ostensibly to protect the native worker; but now it appears to work most effectively for the protection of the native financial operator, who is a less worthy person. But even this reform would scarcely be enough, without some better legislation for the regulation of trading corporations and the prevention of discrimination by the transportation agencies. Some think the latter consideration of greater importance than the former; but our impression is that both kinds of reform are needed.

Changes in Italy.

GAS affairs in Italy have suddenly launched themselves into unusual prominence in our columns by two simultaneous happenings which may tend to a complete change in the facial aspect of the gas supply of that country. The law is practically passed which will permit, on the behest of any local governing body, the conversion, on easy conditions, of company promoted undertakings into municipal property, without the possibility of resistance on the part of the present owners. That is a matter to which we have recently directed attention as the result of the references to the enabling measure by Mr. Arthur Lucas, at the last meeting of the Continental Union Cas Company. It is in connection with that Company, too, or rather of the Union des Gaz (the division between them is merely a nominal one), that the material has been found for two most interesting illustrated articles in the last and current issues of the "JOURNAL." They deal with the new inclined retort and coke plants at the Milan Gas-Works. Their extent and the constructional features are alone an attraction for gas engineers; but there are accompanying matters which enhance interest in these installations. Ever since inclined retorts came into vogue on the Continent, gas engineers there have been opposed, for various reasons, to what they regard as the excessive length of 20 feet, which has become the fashion in this country; and they have contented themselves (excepting in experiment) with retorts ranging from (say) 10 to 16 feet long. But we believe experience in England is causing the longer length to be regarded more favourably by our friends on the Continent; and here at Milan we have actually the first installation—and a considerable one too—of 20-feet inclines in Continental countries. Of still greater importance is the fact that the 32 beds of 20-feet inclined retorts, the pre-existing sixteen beds of 15-feet retorts, and the extensive system of coke plant at Milan, comprise the largest labour-saving installation in any Italian gas-works; and if there is one European country more than another in which labour-saving appliances are needed in gas-works, that country is Italy. Climatic conditions make them a necessity with the growth of the gas supply; but the men themselves appear to be doing their utmost by their behaviour to hasten their adoption. Thus the success of this large installation at Milan may conduce to a considerable change in gas-works' methods in the country. It is also an interesting feature that the 32 settings of 20-feet inclined retorts and coke plant were constructed by an English firm; the whole of the material (excepting the retorts) and the erecting plant being shipped from this country. The Contractors (Messrs. Graham, Morton, and Co.) have shown what English firms can do in the matter of speedy erection; and the rate at which the plant sprang up must have caused no little astonishment among workmen accustomed to taking things leisurely.

The Gaslight and Coke Company's Dividend.

We are informed by the Secretary and General Manager of the Gaslight and Coke Company, Mr. John W. Field, that the accounts for the past half year show that (subject to audit) the balance to the credit of net revenue account will enable the Directors to recommend the payment of a dividend at the rate of £4 8s. per cent. per annum, making, with the dividend paid in September last, a distribution for the whole year at the rate of £4 4s. per cent. The dividend paid for the year 1901 was £4 8s. per cent. The balance carried forward to the next account is £65,146 19s. 4d., compared with £64,834 12s. 5d., the amount brought forward from the 1901 accounts, and £221,570 from those of the previous year. Thus though the amount carried forward on the present occasion is practically the same as in the preceding year, and the dividend for the past six months is also at the same rate as in 1901, the shareholders will, owing to the smaller rate of dividend paid last July, receive 4s. per cent. less over the whole of the year 1902 than they did in the previous twelve months.

The Discovery of the Successful Welsbach Mantle.

Baron Welsbach has won his case in the Austrian Law Courts; and the question is settled completely that the defendant Bernhard Rund has no claim against him in respect of the successful discoveries that he (Dr. Welsbach) effected in 1891. The quarrel between the plaintiff and the defendant has in itself no interest for anyone but the parties themselves. It merely referred to the rights of both in connection with certain commercial transactions that took place between them prior to the discoveries of August, 1891. But the interest in the matter for English readers is that it establishes the fact, beyond all possibility of dispute, that the discovery which, to use Baron Welsbach's own words, represents "the present incandescent mantle"—in other words, the use of 99 per cent. of pure thoria and 1 per cent. of ceria—was made in 1891. That Dr. Welsbach was at once convinced as to the value of the discovery is also shown by the fact that he made an application for a patent in Austria and this country in that year. In the former country it was refused; and in this country, it was abandoned. The 1893 patent, which has been governing the position here since the expiration of the master patent, was communicated from Paris by Mr. Julius Moeller; and that is one of the mysteries in the history of incandescent lighting. Perhaps some day Mr. Moeller will tell the world the story of how it happened.

Incandescent Mantle Combinations.—An Increase in the Price of Thorium.

There is always some consolation in receiving confirmation of important items of news—particularly of movements of a clandestine nature—and yet the consolation is impregnated with regret when it is known that the movement in question is against the best interests of the public at large. Such is the movement which we recently learned was taking place in the incandescent mantle-making trade. Thorium—the principal ingredient of the lighting fluid—we reported had already found its way into a "corner;" and upon this a proposal was being worked up for the combination of mantle makers. What measure of success has attended the latter, we are not yet aware; but this we do know that, unless coerced by pressure brought to bear by the aid of those who have the control of the thorium market, some of the large mantle makers will refuse to have anything to do with the project. Referring to the editorial article in question, the Berliner Gas-Glühlicht Gesellschaft draw our attention to the fact that the "corner" of thorium makers has raised the price for nitrate of thorium to 40 marks per kilo. This increase in price is totally without reason; but it shows the power of the combination. Our correspondents add: "The producers of thorium can very soon force the makers of mantles to raise their prices—and more, to form the combination mentioned by you." It is important that the attention of all concerned should be directed to this piece of information; and we thank our correspondents for it. It shows the necessity for being alert in this particular matter; and, on the first sign of a combination of makers having been effected, it will be well for gas undertakings to know to whom to send their custom.

A Warning Regarding Notices of Dismissal.

A curious case is reported in our "Legal Intelligence" to-day, which shows the necessity for avoiding possible ambiguity in the terms of employment of winter hands on a gas-works. Doubtless in this instance the Sheffield United Gaslight Company thought they had made their intention abundantly clear; and indeed it is one of those cases with regard to which a layman would be almost tempted to say that the contention of each side was right. But the matter could not be legally decided in this way, and so the Sheffield County Court Judge expressed himself in favour of one view, while the Judges of the High Court have accepted the other. The facts were of the most simple character, and were not in dispute. The plaintiff was employed in one of the retort-houses at Sheffield towards the end of 1901; and in this house there was displayed a set of rules, one of which stated that fourteen days' notice of leaving was required from retort-house men who had worked fourteen consecutive shifts, and that the same notice would be given by the Company (except in the event of misconduct, which, however, did not apply in the present instance). Early in December, the plaintiff was served with a written notice to the effect that at the expiration of two weeks from that date his services would not be required, except on daily engagements. Plaintiff was employed for three days after the expiry of this notice; and then came a break of the same number of days. At the end of this time, he asked if there was any work for him, and was told to go to his usual place in the retort-house. He did so, and continued working, with the exception of one or two days, for over two months, when he was told that his services were no longer required. Under these circumstances, the plaintiff claimed that, as he had worked more than fourteen consecutive shifts since his first notice expired, he was entitled to another fortnight's notice; while the Company maintained that he still remained a day labourer. Judge Waddy, in the County Court, found in favour of the Company; but this decision has been reversed on appeal—the Lord Chief Justice holding that the rules in the retort-house controlled the relations between the Company and the men employed there, whose wages were paid by the day, and were not intended to apply only to weekly servants. The plaintiff having come back, and been taken on as a retort-house man, he became, after fourteen consecutive shifts, a person whom the Company could retain for fourteen days, while he was entitled to the same length of notice. It is easy to see that the intention of the Company, by serving the first notice, was to exclude the plaintiff from the operation of the rules exhibited in the retort-house; but unfortunately just sufficient loophole was allowed for this question to be raised. As, however, their Counsel remarked, the Company will, in consequence of this decision, simply have to alter the terms of their notices; and no doubt they will be careful that no similar trouble arises in future. The time is now approaching when gas-works generally will be getting rid of their extra winter hands; and managers should profit by the lesson of the Sheffield Gas Company to see that their notices are open to no other interpretation than the one which they intend shall be put upon them.

An Official Receiver and a Hiring Agreement.

The Official Receiver is a dangerous man to fall foul of, which is a fact that the agent of a well-known firm of gas-engine makers has just learnt to his cost. This gentleman "asserted his rights" by removing a gas-engine which was on a bankrupt's premises under a hiring agreement; and, moreover, he did this, it is said, after undertaking to leave the engine where it was, on the Official Receiver stating (which he did) that the rights of his principals should not be prejudiced. The first time the agent tried to take the engine off the premises, he was stopped; but a subsequent attempt proved more successful, in spite of the protests of the bailiff who was in charge of the place. This exploit has been held to constitute a real interference with the Official Receiver, and so the agent has been committed for 21 days to Stafford Gaol for contempt of Court. Execution of the sentence, however, has been stayed for a week, to enable the gentleman in question to make his submission to the Court, should he feel so inclined—which, we should think, he in all probability will. It was admitted that the makers had power to resume possession of the engine under the hiring agreement; but evidently this did not justify its being carried off without the consent of the Official Receiver. In

such a case as this, there is a right and a wrong way for people who have goods out on hire to recover possession of their property; and all the trouble in the present instance seems to have arisen from the agent taking the latter course rather than the former. We hope he will avoid the three weeks in Stafford Gaol.

Market Position of Sulphate of Ammonia.

Messrs. Bradbury and Hirsch's annual review of the sulphate of ammonia market has become quite an institution; and this week we are able, through the courtesy of the firm, to reproduce those portions of the report for last year in which our readers are more particularly interested. The review is an exceedingly useful one, especially to those gas managers—and their number increases yearly—who manufacture (and therefore have to dispose of) the valuable product to which it refers. A careful study of the past is essential to all who would correctly read the future; and this, thanks to Messrs. Bradbury and Hirsch, it is rendered possible for everyone to undertake. Even as regards the future, however, readers are not entirely left to form their own conclusions, for the authors (than whom no one is in a better position to judge) express their opinion that, in the main, the course of the sulphate market will be determined by the market for nitrate, and that the fortunes of the latter will depend upon the policy pursued by beet growers. They express themselves as satisfied that, at present prices, the moderate supplies available of both articles—the present year opened with a stock of only 9000 tons of sulphate of ammonia, as against 14,000 tons in 1902—will find a ready market. This cannot be considered an unsatisfactory outlook, for the present prices are higher than the average received by makers in any year since 1894. In that year, owing to production being withheld from the market, the average price per ton of good grey (24 per cent.) sulphate, f.o.b. Hull, was £13 3s. 8½d.; while for 1902 it was £11 16s. 3d. During the intervening period, the worst time experienced was in 1896, when the average figure obtained was no more than £7 18s. The increased output of sulphate of ammonia from gas-works was insignificant last year—the figures being about 146,000 tons, as against 143,000 tons in 1901; and this absence of elasticity, Messrs. Bradbury and Hirsch say, can only be accounted for by the larger use of electricity and water gas in some places, which has counteracted the increased quantity of coal gas made in others. This small increase in the output cannot, however, be regarded as a disadvantage—more especially in view of the remarks made by the authors with regard to the amount of sulphate of ammonia which will come upon the market when the manufacture of power gas is undertaken on a larger scale. The additional 20,000 tons or so which they see looming in the "not very distant future," will certainly be a serious factor to be reckoned with.

WATER AFFAIRS.

The Teachings of Rainfall Records.

THE subject of the weather has always been recognized as an excellent means of opening a conversation, inasmuch as it is one in which general interest is taken. So much depends upon it, that a distinct benefit has been conferred upon the community by the regular publication, in the daily and weekly newspapers, of the now familiar chart and forecast, which furnish evidence of the more systematic study of meteorology which has characterized (say) the past quarter of a century. To the supplier of water, no branch of this very large subject is of so much importance as that of rainfall; and therefore it may not be unprofitable to direct attention to the interesting letter of Drs. Sowerby Wallis and Mill (who are continuing the work carried on for so many years by the late Mr. G. J. Symons), on the rainfall of the past year, which appeared in "The Times" on the 10th inst. The period in question opened with floods; and if the "man in the street" were casually asked what he thought of the weather generally during the twelve months, he would no doubt declare that it was wretched. The prevailing opinion appears to have been that 1902 was a very wet year; and yet the above-named gentlemen assure us—and they adduce their records in support of the assertion—that it was quite otherwise. It is true that the summer was rather sunless, and that there were more than the ordinary number of rainy days; but on none of them was there any considerable fall, so that the total was really less than the average of the thirty years from 1870 to 1899. The following figures represent the percentages for last year of the average for the four great divisions of the United Kingdom: England, 82; Wales, 85; Scotland, 87; and Ireland, 90—or for the entire kingdom, 85 per cent.

Going farther back, Drs. Wallis and Mill show us by tabulated records that of the eighteen years from 1884 to 1901 only four had more than the normal fall, and that in this period there was a total deficiency of fifteen months' rain. At the close of 1901, therefore, we were a year and a quarter in arrear. Including 1902, and taking a period embracing that and the preceding nine years, we are told that only 9¼ years' rain fell over England and Wales; while in 16 years it was only equal to that due to 14⅝ years. By grouping the observation stations in these two divisions according to their geographical position in the south, east, and west of England (including Wales), with a view of illustrating the incidence of the drought in different parts of the country during the past ten years, it is shown that while in the south and west there were three years out of the ten when there was more than the average rainfall, in the east there was only one such year; and that the average deficiencies are 10·6 per cent. for the east, 7·2 per cent. for the west, and 5·5 per cent. for the south. These figures represent respectively the rainfall of rather more than a year in the east, nearly three-quarters of a year in the west, and rather more than half a year in the south.

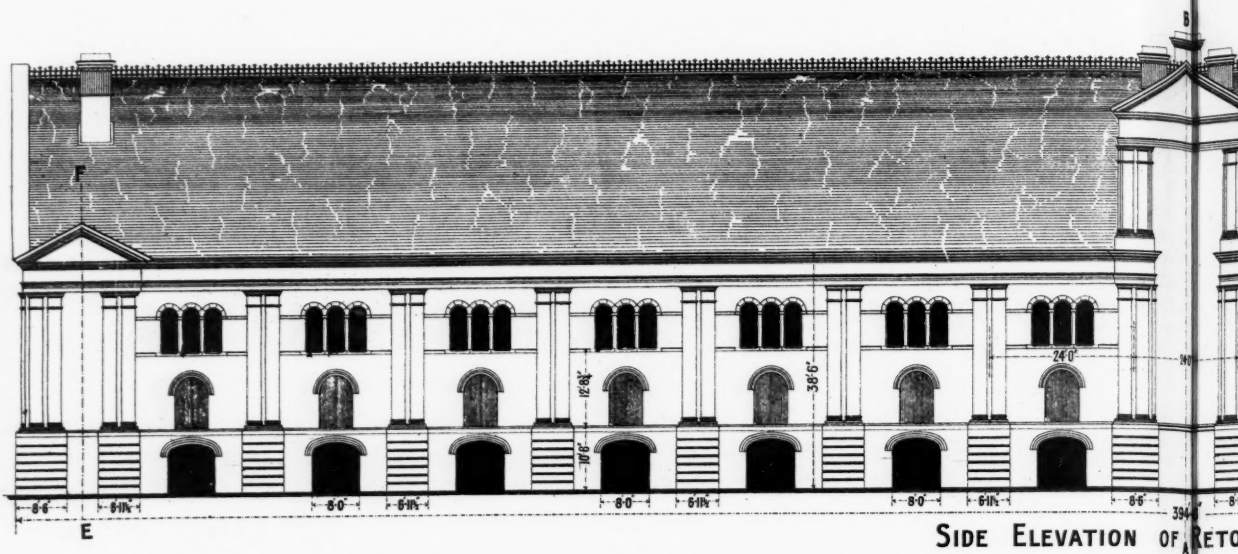
The position is sufficiently serious to give rise to reflection. The effect of this absence of rain has made itself felt in several places, notably in Essex; and Leicester, as was recorded last week, is getting into a critical condition. Of course, we cannot command the rain; we can only do our best, by the provision of ample storage, to take care of the water when it does come. So far as the Metropolis is concerned, we do not fear a recurrence of the trouble which arose in the East-end a few years ago. Though the number of services grows continuously (last month there were 20,755 more than in December, 1901, and 5½ million gallons more water was supplied daily), we have the bountiful Thames to rely upon, and its waters can now be distributed—thanks to the introduction of the intercommunication system—more freely than formerly. Moreover, there are possibly sources beneath our feet which only require tapping to yield a further supply. Without going so far as to wish that the present year may be a really wet one, we may nevertheless indulge the hope that the meteorological conditions may be such as to compensate, to however small a degree, for the deprivation which the records show the country has sustained.

Profitable Utilization of Watershed Areas.

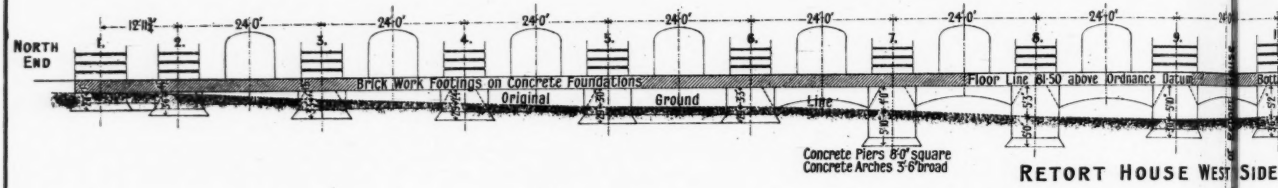
It will be remembered that in the early part of last year the Halifax Water-Works Committee requested three experts to report upon a proposal to afforest the gathering-grounds of their Ogden and Mixenden reservoirs. All the gentlemen consulted gave it as their opinion that such a course would be beneficial to the water supply, both as regarded quality and quantity. The idea has also been extensively adopted at Swinton, one of the new water supply districts of Leeds. There are, however, many other catchment areas which doubtless might with advantage be treated in the same way; and attention is called to the matter in a report just issued by a Departmental Committee appointed last February by the President of the Board of Agriculture to inquire into the present position and future prospects of forestry in Great Britain. In the course of the report, the Committee express the opinion that a considerable amount of afforestation might usefully be carried out by corporations over their watershed areas. The trees, they point out, will not only contribute materially to the retention of the rain that falls over the area, and thus assist in regulating the water supply, and in preventing floods and water famines, but will tend to the purification of the water, and should also, properly managed, yield a fair and regular income on the capital expended. The Committee add that, inasmuch as such catchment areas will be under corporate control, and less subject to changes of management than land controlled by private individuals, there is no reason why they should not also ultimately serve as demonstration forests, and be available for the instruction of students. From these remarks, it is clear that the subject is one which is well worth the serious attention of all engineers responsible for the management of large watersheds.

The Granton Works of the Edinburgh

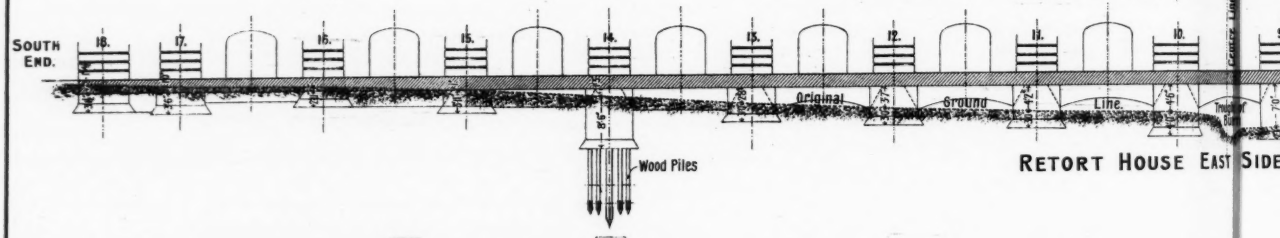
Retort and Machine



Side Elevation of Reto



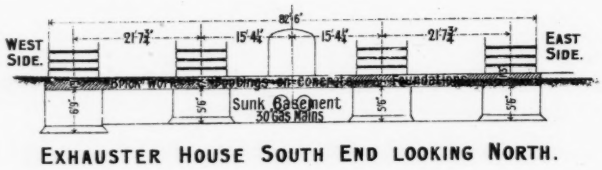
Retort House West Side



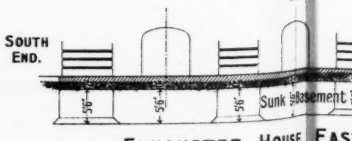
Retort House East Side

(South) Front Elevation shewing Machinery House annexed to Retort House.

Side Elevation of M annexed to Ret



Exhauster House South End looking North.



Exhauster House Eas

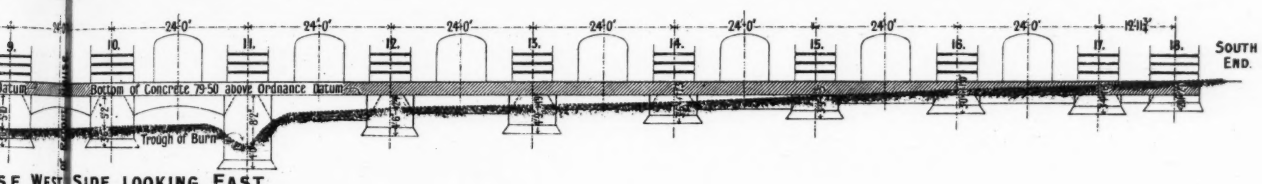
Copyright at Stationers' Hall.

nburgh and Leith Gas Commissioners.

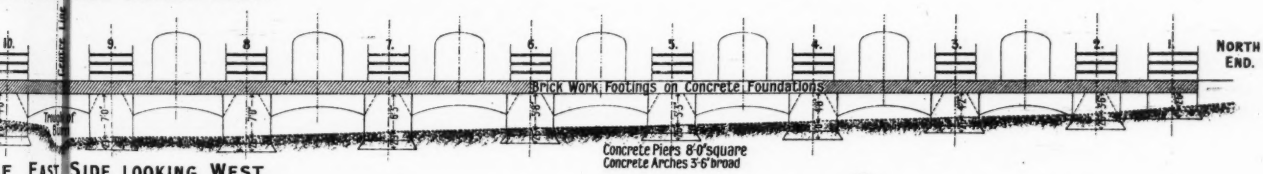
MACHINERY HOUSES.

No. 3.

N OF RETORT HOUSE.

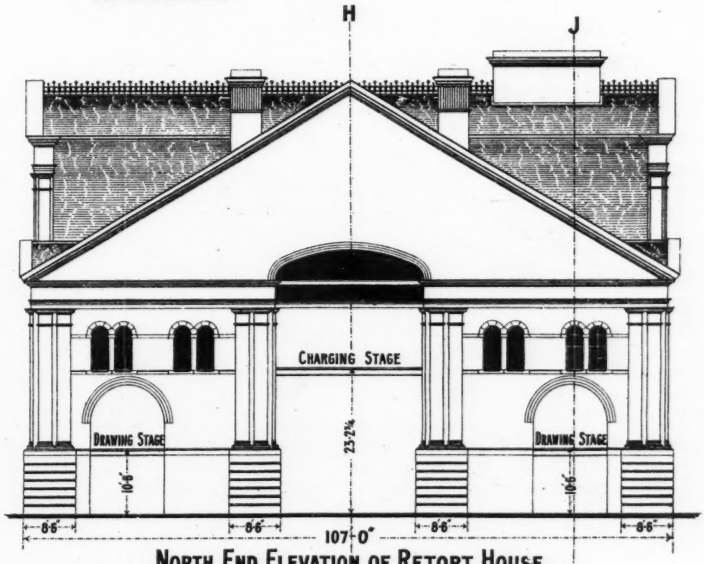


SE WEST SIDE LOOKING EAST.

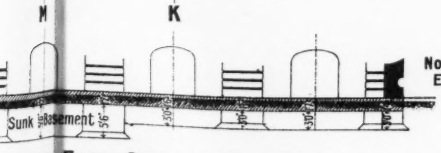


E EAST SIDE LOOKING WEST.

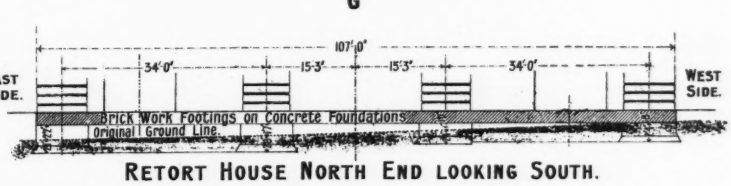
LEVATION OF MACHINERY HOUSE
NNEXED TO RETORT HOUSE.



NORTH END ELEVATION OF RETORT HOUSE.



HOUSE EAST SIDE LOOKING WEST.

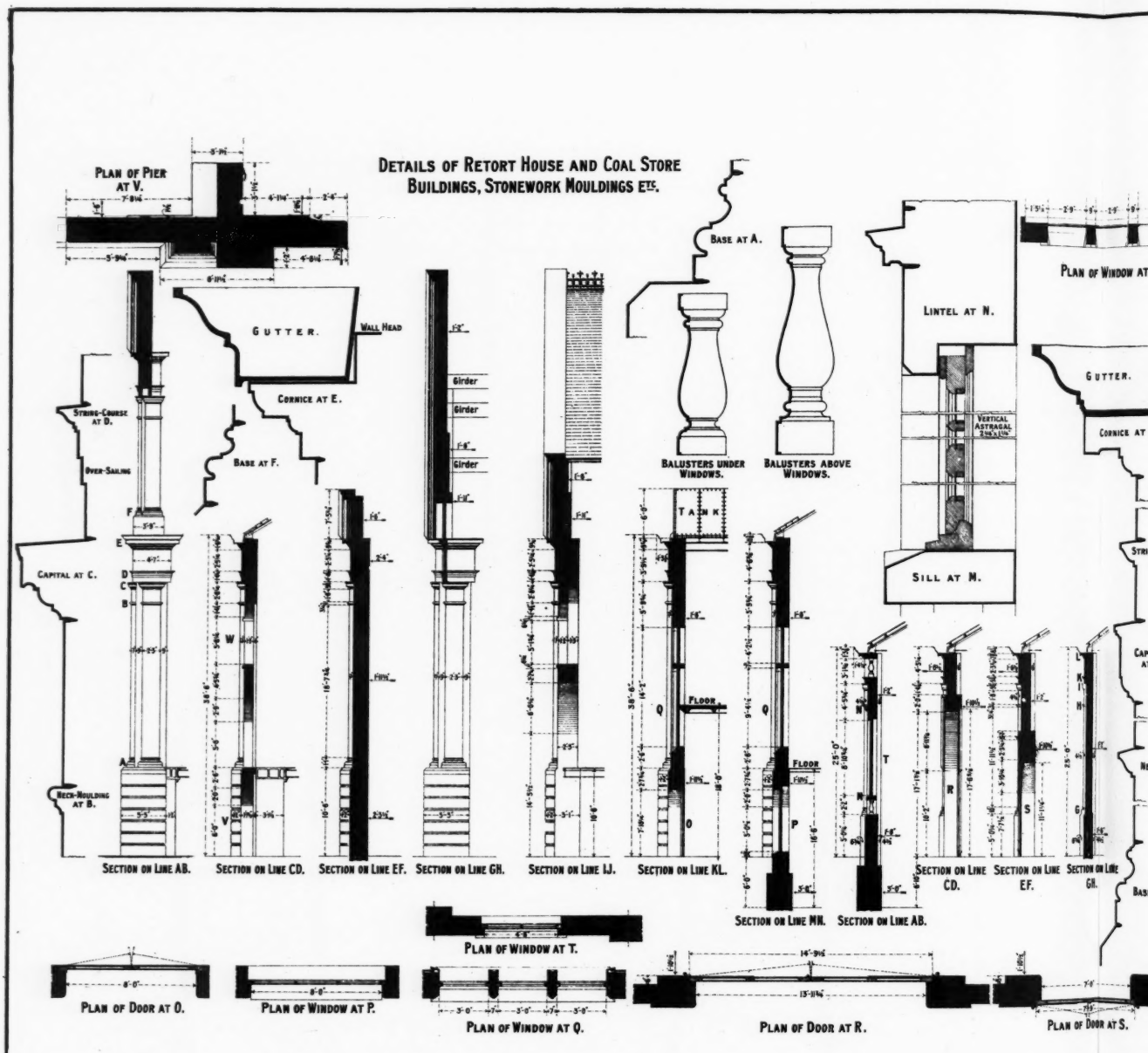


RETORT HOUSE NORTH END LOOKING SOUTH.

WALTER RALPH HERRING,

M.INST.C.E., *ENGINEER.*

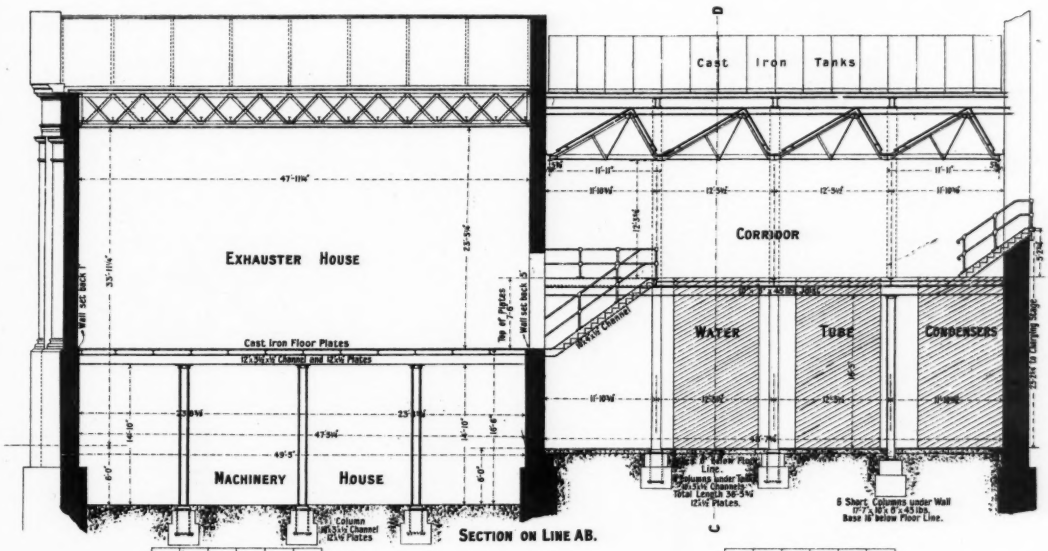
The Granton Works of the Edinburgh

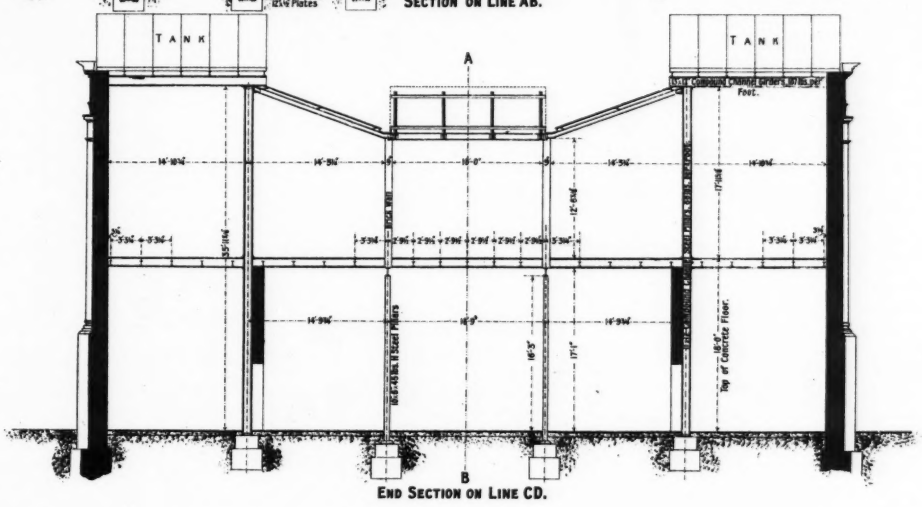


Copyright at Stationers' Hall.

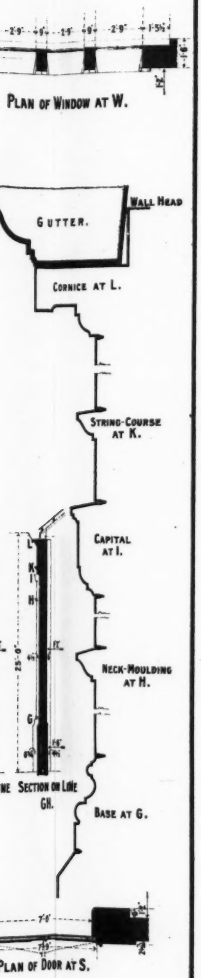
No. 4.

EXHAUSTER HOUSE. MESSROOMS. &C.





WALTER RALPH HERRING,
M.INST.C.E., *ENGINEER.*



THE GRANTON WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

DESCRIPTION PREPARED

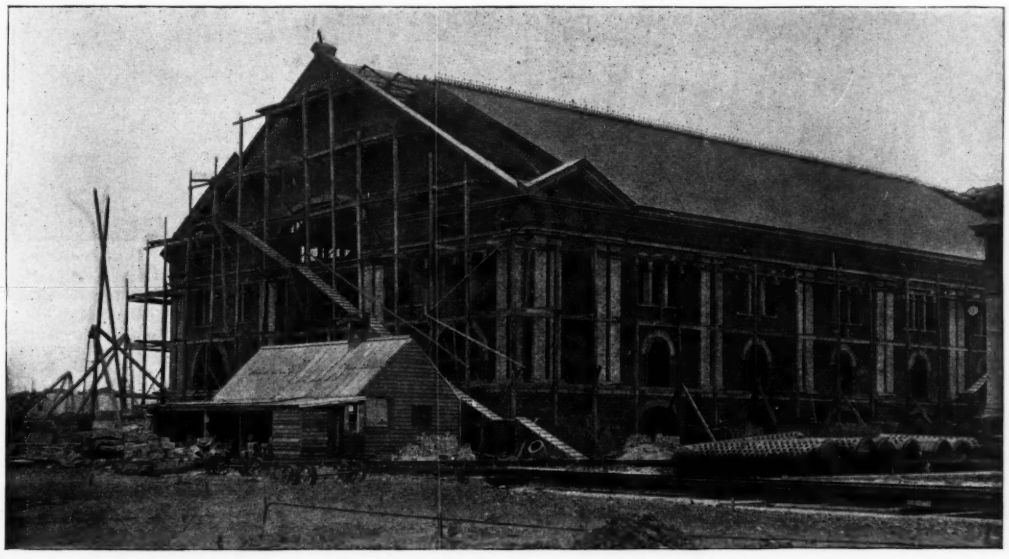
BY

WALTER RALPH HERRING, M.INST.C.E., *Engineer.* *

ARTICLE III., accompanied by two Plates. Plate No. 3 shows the Retort-House with Machinery-House Annexe, together with Sections for the Foundations of same. Plate No. 4 shows the details of the Retort-House and Coal-Store Walls, Stonework, Mouldings, &c.; also the Transverse and Longitudinal Sections of the Exhauster-House, Machinery-Rooms, Mess-Rooms, &c.

The high standard of architectural design which prevails in the Northern Capital demanded that serious consideration should be given to the general appearance of the works from an architectural point of view, so far as this could be accomplished without seriously adding to the cost of construction, in order to produce mere ornate effect.

From an engineering point of view, plan is perhaps the most essential feature of architectural design. A number of perfectly featureless buildings when grouped into some uniform order, present a pleasing effect without their being individually treated with any degree of ornamentation whatever. Next in order is, perhaps, constructional suitability for the purposes for which the buildings are to be used—embodying as this must do solidity and strength so placed as to exactly serve the purposes intended. Thirdly, design or the disposition of the substance of the building, in order that while every part is fully serving some useful and definite purpose, it may also be disposed so as to produce the impression of order, harmony, and utility. Lastly, ornamentation—which can be greatly acquired by a skilful interpretation of the former rules—must also sometimes be added merely for



PHOTOGRAPH No. 12.—Showing the north half and gable of the retort-house in process of erection. (July 24, 1901.)

ornate effect. When this is the case, however, the simplest form of ornamentation is usually the most effective upon engineering structures.

Such were the rules which I laid down as my guide in dealing with the Granton works, formulated as they were after many years of close observation both at home and abroad. After determining the proportions of the respective buildings, I had poles erected at all corners and angles, and lines stretched enclosing the building sites, in order to enable me to judge of the general disposition of the various structures, and the relative harmony of their positions.

Edinburgh and its surroundings is a stone-built city; but at the time it was necessary to commence the construction at Granton, the building trade was in a most flourishing condition, which rendered the procuring of stone a very difficult as well as an expensive matter. The opening of a stone-quarry upon the site of the works rendered a large quantity of stone available, but insufficient to warrant a decision to construct the buildings of stonework.

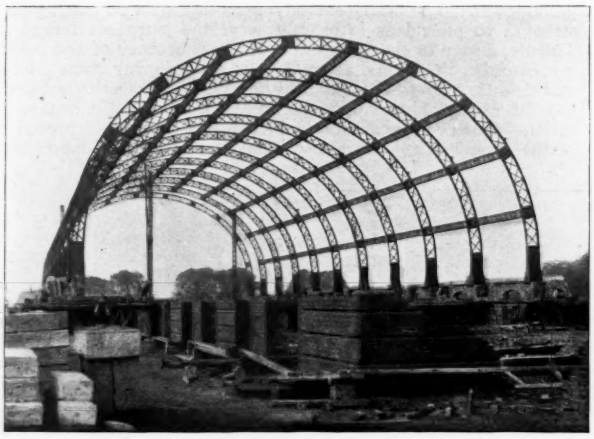
PHOTOGRAPH No. 13.—Showing the brickwork beneath the floor-line, elevating the section of the wall from this point to a point 10 ft. 6 in. above the floor-line. (Feb. 10, 1900.)

PHOTOGRAPH No. 14.—Showing the construction of the internal buttresses for supporting the main roof girders, with the foundation bolts put in position. (May 10, 1900.)

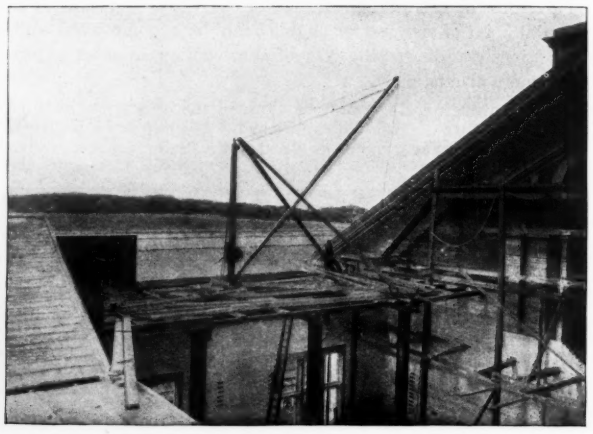
* All Rights of Reproduction Reserved.

The situation of the works upon elevated land immediately at the mouth of the Firth of Forth—exposed to sea air and salt spray during north-easterly gales—demanded that the materials of which the buildings were to be constructed (particularly so far as their exterior face-work was concerned) should be something of a most durable character, and one that would not readily absorb moisture. After due consideration, therefore, it was ultimately determined to construct the buildings with brick, employing a hard terra-cotta red facing-brick for the exterior surfaces, and machine-made composition brick of semi-fireclay properties for the interior work; the stonework alone being used where other materials were unsuitable.

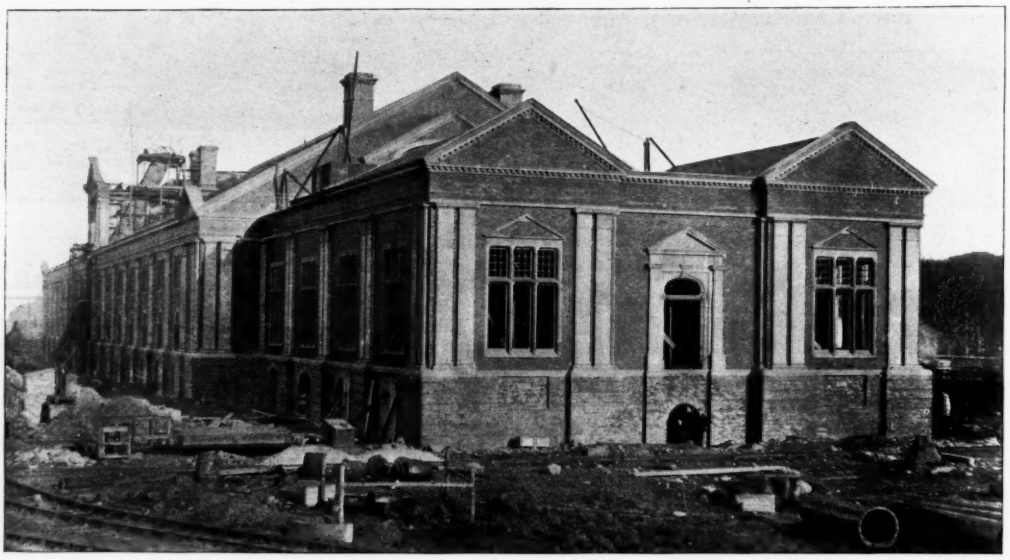
The general proportions of the buildings having been determined upon, so as to accommodate the various large plants to be enclosed within them, their general design had next to be dealt with. The semi-elliptical girder form of roof construction was determined to be the most economical for covering the double benches of inclined retorts that were to be placed within the retort-house. The building is practically 100 feet broad. The springing line of the roof girders is at a point 10 ft. 6 in. above the ground-line; and longitudinally with the building these girders are placed 24 feet apart. The main girders rest upon a pier projecting beyond the inner face of the side walls and within which foundation-bolts are built—See Photographs Nos. 13 and 14. Immediately at the base of the springing-line of these girders, the main strut to the front buckstays of the benches—also acting as one of the floor-joists of the drawing-stage—is attached, so that the outward thrust, owing to the expansion of the retort-bench,



PHOTOGRAPH No. 15.—Showing the construction of the retort-house to a point 10 ft. 6 in. above the floor-line, with the semi-elliptical girder roof erected thereon. (Aug. 13, 1900.)



PHOTOGRAPH No. 17.—Showing the erection of the water tanks above the workmen's lavatories, between the south gable of the retort-house and the exhauster-house. (Oct. 10, 1901.)



PHOTOGRAPH No. 16.—Showing the southern end of the retort-house, with the annexe consisting of the exhauster-house adjoining. (Nov. 1, 1901.)

is transmitted to the main piers at this point, and depends for its thrust upon the resistance of the piers supporting the same and the general construction of the building at this point.

In reference to Photograph No. 13 it may be mentioned that the total thickness of the wall from the outside to the inside face is 6 ft. 3 in.; the buttress projecting 3 ft. 1½ in. inside; the panel being 4½ inches deep. The substance of the base part of the wall is 1 ft. 6½ in.; and the rusticated base 1 ft. 2 in. by 6 ft. 11½ in. broad, which on elevation is made to look merely as an ornamental base supporting the twin pilasters. The plan of this portion of the work, however, probably illustrates its construction more fully.

On the upper left-hand corner of Plate No. 4 a half plan of the pier at the floor-line is shown in section, and a half plan above the stage-level. From this, it will be seen that practically the substance of the structure as a building ceases at a point 10 ft. 6 in. above the yard or floor level (as seen on Photograph No. 15), notwithstanding the fact that the total height of the side walls is 38 ft. 6 in. The bulk of the work is panelled to 14 inches, except where the pilasters are continued from the main base; the substance of the work at this point being 25½ inches over all.

In theory, the building is, therefore, a series of columns or piers of masonry at 24 feet centres, with the intervening spaces filled in with brickwork as lightly as could possibly be constructed to withstand the normal wind pressure.

The substance at the base externally is made to present a certain degree of ornamentation, forming a bold base for a pair of twin columns or pilasters; these columns being mostly constructed of buff-coloured terra-cotta bricks, with stone moulded bases, collars, and capitals.

Supported upon the columns or pilasters and throughout the length of the building a stone string-course, 18 inches wide by 6½ inches deep, is made to oversail the lower work. Upon this a red-brick frieze course is laid, consisting first of four rows of red terra-cotta brickwork, the first two courses projecting ½-inch beyond the stone or brick below. Immediately on this, a small moulding is laid; and above this three courses of red terra-cotta brickwork are built. Above this again six courses complete the brick wall up to the level of the stone cornice supporting the cast-iron gutters; the gutters themselves forming the principal member of this cornice, and are painted the same colour as the stone.

These details will be better appreciated on reference to Plate No. 4.

On each side, and centrally in each bay, at the floor-line, openings are provided for access of light and ventilation to the furnace clinkering floor. The doorway, which is 8 ft. wide by 8 ft. high, is covered with a semi-elliptical arch in buff-coloured bricks. Above the 10 ft. 6 in. level (or on a level with the drawing-stage floor), openings 5 ft. 6 in. wide by 8 ft. 2 in. high, immediately above the preceding ones, are provided, covered with semi-circular arches in buff-coloured brick. These on both sides of the building are fitted with corrugated iron sliding doors running on overhead rails. Immediately above these openings in each bay, three-light windows, with stone sills and circular heads and mullions, are provided. On the eastern side of the building, these windows have been glazed in stamped steel frames. On the western side —being sheltered by the coal-store buildings—it is not intended to glaze them.

Longitudinally with the side elevation of the retort-house (Plate No. 3), in order to break the long monotonous line—over 400 feet long—dormer gables, with a slight projection from the main building, have been cast at either end; and in the centre a pediment dormer has been constructed on the one side to permit of the elevators passing clear into the building, and on the opposite side, a similar construction has been carried out to facilitate the ventilation of the buildings.

The north gable end of the building (Plate No. 3) has a central opening from the ground line, 22 feet wide, rising to a point on a line with the top of the cornice. At this point, a semi-elliptical arch in buff brick is thrown across the opening, supported by a permanent centring, constructed of steel, which is afterwards to be glazed. The object of this opening is to admit light and air between the two benches, as well as railway access to the space between the two benches which is used for a fireclay store.

Annexed to the retort-house at the southern end (shown on Plates Nos. 3 and 4, and Photograph No. 16) a block of buildings of similar general design externally is attached, measuring 101 ft. 7½ in. (over all) in length by 82 ft. 6 in. in breadth, as distinct from 107 feet which is the over-all breadth of the retort-house. This block of buildings contains on the ground-floor (level with the retort-house), a water-tube condenser house, stores for the keeping of duplicate parts of gearing and machinery in connection with the coal and coke handling plants, together with a blacksmith's shop on either side, with direct access to the retort-house. Above these, the workmen's mess-rooms, lavatories, and bathrooms, &c., are arranged, together with a gangway above the water-tube condenser house, dividing the lavatories and bathrooms from the messrooms, and forming also a corridor communicating between the exhauster-house and the retort-house. The right-hand half of Plate No. 4 illustrates these mess-rooms.

Photograph No. 17 shows, above the mess-rooms and lavatories, and forming part of the roofing, two large water-tanks of cast iron in course of construction, each measuring 48 ft. by 18 ft. by 6 ft. The front half of this building is a sunk basement 6 ft. 6 in. below the yard level, and containing the hydraulic pumps and the engines and gearing for driving the coal and coke handling plants. On the first floor, the exhausters and engines and accessories are placed.

The general detail of the arrangement of this block will be better understood upon reference to Plates Nos. 3 and 4.

This annexe, being attached to the south end of the retort-house, and communicating directly therewith, also faces the main road or approach to the works. Its general design has, therefore, been arranged so as to produce a pleasing elevation in tone with the main block; the pilasters and cornice, as well as the gables, the doorway, and staircase communicating thereto, being constructed entirely of stone with red terra-cotta brick filling in. The windows also are of an entirely different design to the remainder, and constructed in stone.

Plate No. 3, in addition to showing the side elevation as well as the north and south end elevations of the retort-house block, and the side and front elevations of the machinery and exhauster house, also shows the details of the levels and the character of the foundations for the respective buildings. Beneath the retort-house elevation, the dark shaded line illustrates the natural level of the ground before operations were commenced, and the varying levels to which it was found necessary to carry the main piers supporting the concrete arches and the side walls of the retort-house. This plate particularly illustrates the varying characteristics of the substratum. It will be seen that underneath pier No. 5 from the south end of the east elevation on the side wall of the retort-house, it was necessary to pile for suitable foundations, whereas on either side a suitable foundation was found at a moderate depth beneath the natural surface.

Plate No. 4 shows in sufficiently graphic detail the varying thicknesses and dimensions of the side walls of the retort-house, in addition to important scale delineations of the mouldings employed in various parts of the elevation.

The longitudinal sections through the retort-house block show the exhauster-house and machinery-house beneath. The gangway of the corridor running from the exhauster-house to the retort-house with the water-tube condensers beneath, as well as details of the roof construction of this particular part, does not call for further description at the present stage. Beneath this view, a transverse section, showing the mess-rooms and corridor, is also exhibited.

GAS AND WATER PRECEDENTS.

No one who has had to conduct legal business of any kind will, we think, be disposed to question the value of a collection of precedents. However retentive the memory may be, it is liable to temporarily fail just at the moment when the information stored therein is most needed; and it is then that the labours of the compiler of a book in which it may be readily found are appreciated at their real worth. What has been accomplished in this direction for solicitors by many able members of the legal profession, Messrs. Stevenson and Burstal have done for consulting engineers and others whose practice is confined mainly to the Committee-rooms of the two Houses of Parliament. Nearly a quarter of a century ago, as many "JOURNAL" readers are aware, the late Mr. G. W. Stevenson published a useful collection of "Precedents in Private Bill Legislation relating to Gas and Water." This was the precursor of a book of more convenient size which his son, Mr. E. H. Stevenson, brought out a few years later in collaboration with his partner, Mr. E. Kynaston Burstal. That the book was a success may be judged from the fact that the authors received many requests to bring their compilation up to date; and, in response thereto, they have just published the precedents for the eleven years ending with 1901.* The particulars furnished are presented in tabular form, where this is most suitable, as in the case of the statistics relating to capital, &c.; otherwise the headed paragraph is the medium adopted. The latter is, in fact, the only practicable way in which the authors were able to indicate the special features of the Acts or Orders under consideration; but they have done it as concisely as possible. The precedents themselves occupy 147 octavo pages, and they are followed by two indexes which greatly facilitate reference to them. These bring up the total number of pages to 174.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List see p. 172.)

THE fortnightly settlement was the chief care of the Stock Exchange last week; and it militated, as usual, against the development of new business. The general tendency—if it be possible to generalize where different markets were inclined to take lines of their own—was dull. At one time, an attempt was made to be sanguine over the course of things in South Africa; but the public did not seem to catch the feeling, and so it failed. The prospect of new big loans coming out had the effect of depressing Consols; and the gilt-edged division in general was not at its best. In the Money Market, there was a strong demand, and the available supplies were well employed at remunerative rates, and discount rates were steady. In the Gas Market, business was extraordinarily quiet; and on one or two days the whole aggregate of operations would not suffice to make up an ordinary fair day's dealings in one issue. But it is noticeable that, so far from drooping (as they well might from lack of support), prices came out uniformly better. Some very fair advances have been made in quotations; while there was no movement at all, *per contra*, downward. In Gaslight issues, transactions in the ordinary were very quiet and humdrum; and the price was so even and steady that it never ranged outside the limits of 86¾-87½. The secured issues came in for more than their usual share of attention. The maximum looked as if it would bear an advance of 1. South Metropolitan was a good deal quieter. Buyers raised their price a point; but the figures at which stock changed hands were not better than those of the previous week. In the Suburban and Provincial group, there was a good deal more movement in prices, though dealings still continued very much restricted. Brentford and Brighton issues were the chief gainers; and Plymouth came out rather better on *ex div.* adjustment in view of the improved rate of dividend. Among the Continental Companies, Union was still very weak, and was marked once as low as 132½; European was firm; and Imperial, after a little hesitation, came out strong, and closed with a transaction at 208. Of the remoter undertakings, Oriental advanced on the strength of their successful installation of the incandescent system. Among the Water Companies, there was an absolute calm; and no change was made in any quotation.

The daily operations were: Gas opened very quiet, but strong, on Monday. Brighton original rose 2, ditto ordinary 3, and Imperial 1. There was no movement on Tuesday. Wednesday's operations were very few; but prices continued to advance. Oriental rose 3, Brentford preference 2, and South Metropolitan ½. Thursday was steady. Brentford new improved 2. Nothing changed on Friday. Saturday's prices were some of the best of the week. Imperial advanced 1.

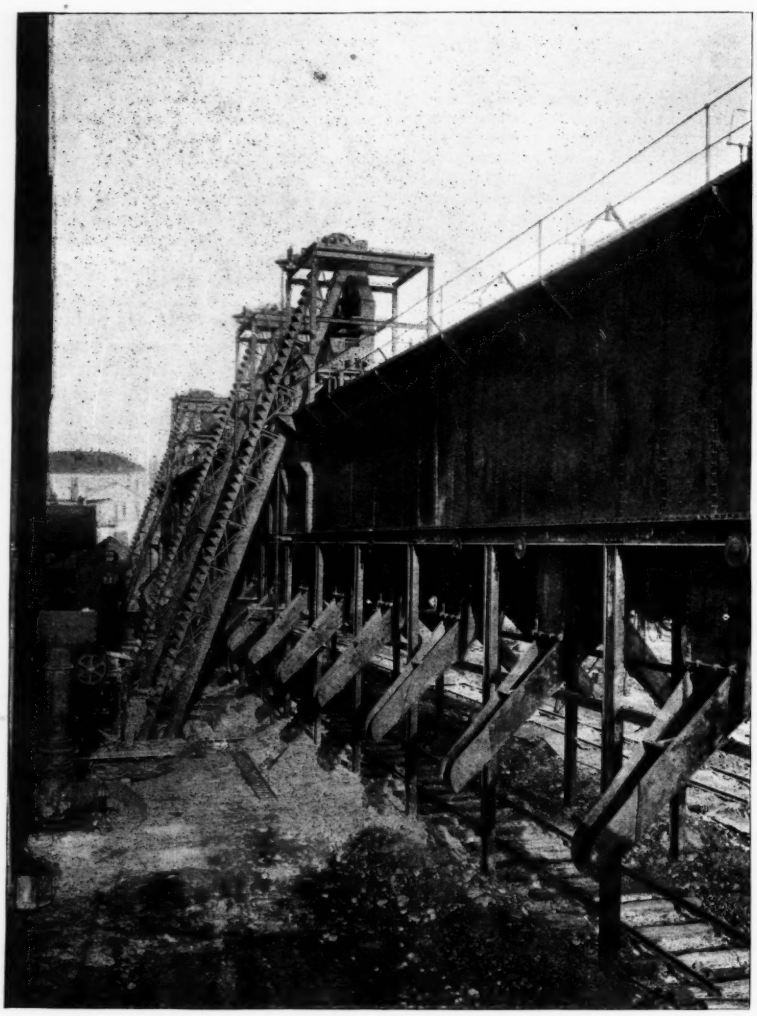
Mr. Eli Bull, the Manager of the Pinner Gas Company, severs his connection with the Company at the end of the month. Mr. Bull has been employed at the gas-works close on 30 years, and is one of the most highly respected residents of the place.

* "Precedents in Private Bill Legislation Affecting Gas and Water Undertakings—1891 to 1901." Compiled by E. Herbert Stevenson, M.Inst.C.E., F.S.I., and E. Kynaston Burstal, M.Inst.C.E., M.I.Mech.E., &c. London: Walter King: 1902.

AN ENGLISH INCLINED RETORT INSTALLATION IN ITALY.

SECOND ARTICLE—THE COKE PLANT.

IN conjunction with the installation of inclined retorts at the Milan works of the Union des Gaz (described and illustrated last week) is, as already indicated, a coke plant of quite noble proportions and capacity; and it needs to be both, seeing that it has to deal with the spent charges of the 32 beds of nine 20-feet retorts, and the older 16 beds of 15-feet retorts. The whole of the work, including the design, was entrusted to the same firm of Contractors as the new inclined retort-benches—Messrs. Graham, Morton, and Co., of Leeds. We have tried, by making a selection from the photographs taken as the work was approaching completion, to give our readers an idea of the site with which they had to deal. Looking at the photographs, it must, we think, be admitted that the scheme of the plant—both in its disposition and general character—is well adapted to secure the utmost service out of the area at disposal, that the designers have kept generously in view the extent and heavy nature of the work the plant will be called upon to perform, and that every section contains its points of engineering attractiveness. The pictures only bring before our view the outdoor plant; and there are the two long stretches of conveyors running through the new house, which, as already stated, is 254 ft. 3 in. in length. It follows that there must be for the two conveyors in the house at least 500 feet of trough; and over 1000 feet of chain, including the return. In addition, the contract included the fitting up of the pre-existing house with a conveyor, so that in all the firm laid inside the three houses about 750 feet of trough, and fitted 1500 feet of chain. Remembering this, and viewing the extensive outside plant, the question of capital cost cannot fail to occur to one; but if in England it is found that such plant more than justifies its existence by the saving it effects in labour, how much more should it do so in a country in which a totally different measure is given as to what constitutes an honest day's work for an honest day's pay? Besides this, the severity of climatic conditions in Italy appeals to the humanitarian employers of labour in such operations as those of the retort-house to take advantage of all means that will keep their men from exposure to excessive bodily fatigue and discomfort. Old Sol's rays, as we showed in our final remarks last week, beat down unmercifully on the retort-house worker and the wheeler-out of hot coke in the summer time in the district of Milan, and yet the rigors of winter are even more intense than here. Thus, from all points of view, a coke plant must be a *desideratum* in most Italian gas-works of any pretensions.



Copyright.

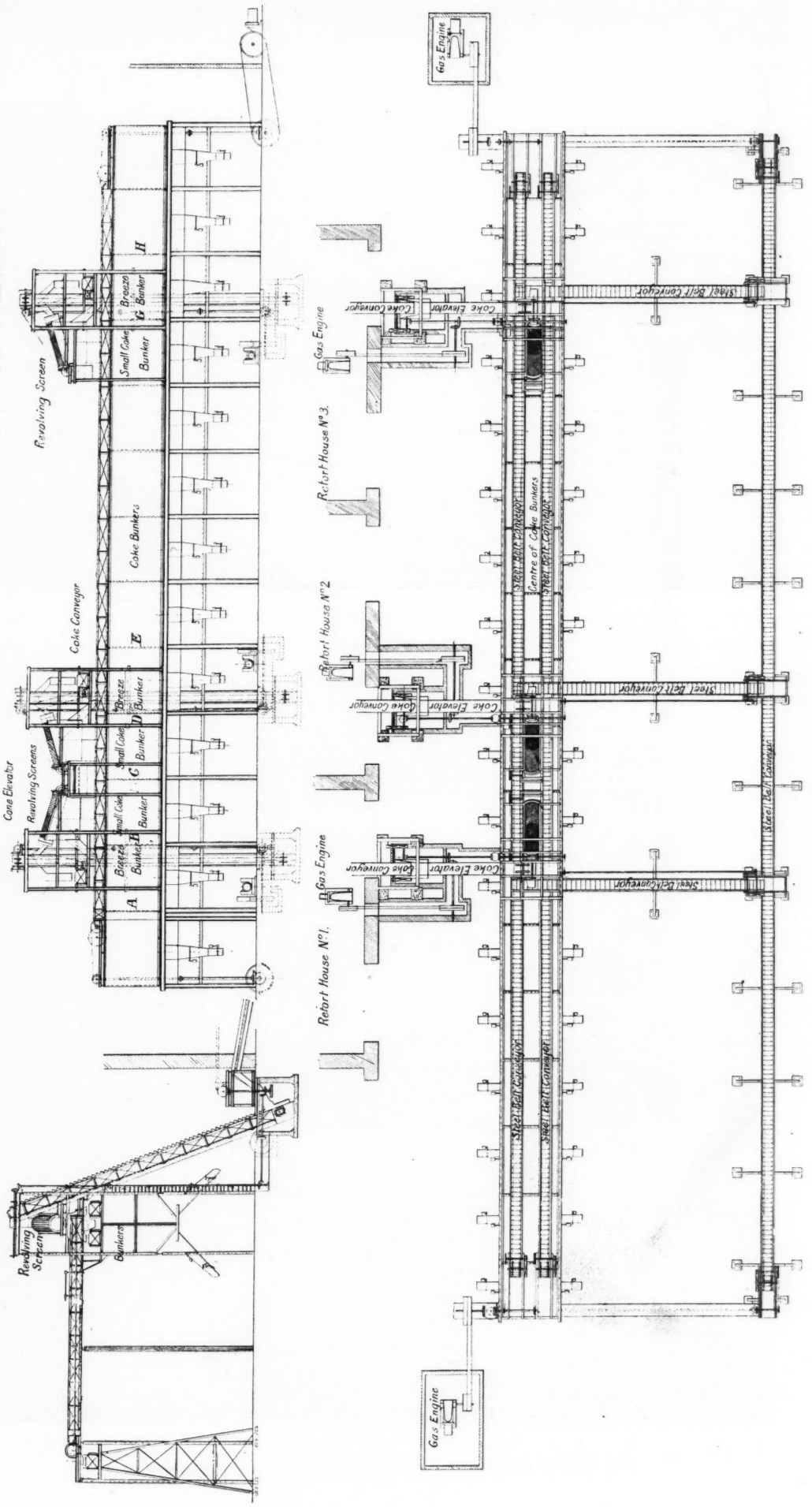
PHOTOGRAPH NO. 1.—COKE-ELEVATORS, DELIVERING TO SCREENS AND CROSS CONVEYORS.

But to return to the particulars that we have to give regarding the plant now being specially dealt with. In last week's article, it was stated that the hot coke conveyors in the houses are placed on a level with the clinkering-floor; and good reasons for this were given. This position of the hot-coke troughs in part contributed to another variant from the usual in the design of the first piece of the coke plant that is encountered on emerging from the retort-houses. We say "partly," because a further element in compelling the variation was the limited site at disposal for the coke-yard. It was at first hoped that it would have been possible to get sufficient space to carry an inclined conveyor from the retort-house conveyors to fill the elevated storage bunkers; but this was found impracticable. Therefore, the inevitable course was to drop the coke into the boots of the elevators, and raise it by them to the screens, or to the cross conveyors for storage purposes. Although this is not such a convenient, straightforward, and compact arrangement as that generally adopted, it is not in this case a matter of very great moment. The dropping of the coke into the elevator boot, and the lifting of it in this manner, contribute to the breakage of the coke; but this is not regarded as detrimental, seeing that there is big demand for broken coke in the district. So it happens that here what might in some cases be a drawback is a point of little consideration. The variation named brought in its train two advantages of considerable importance. It enabled first a long line of thirteen storage bunkers to be placed conveniently for the railway siding, and near to the gable-ends of the three retort-houses; and, secondly, it permitted of the yard storage conveyor being placed further out, which will have a beneficial influence in erecting further extensions.

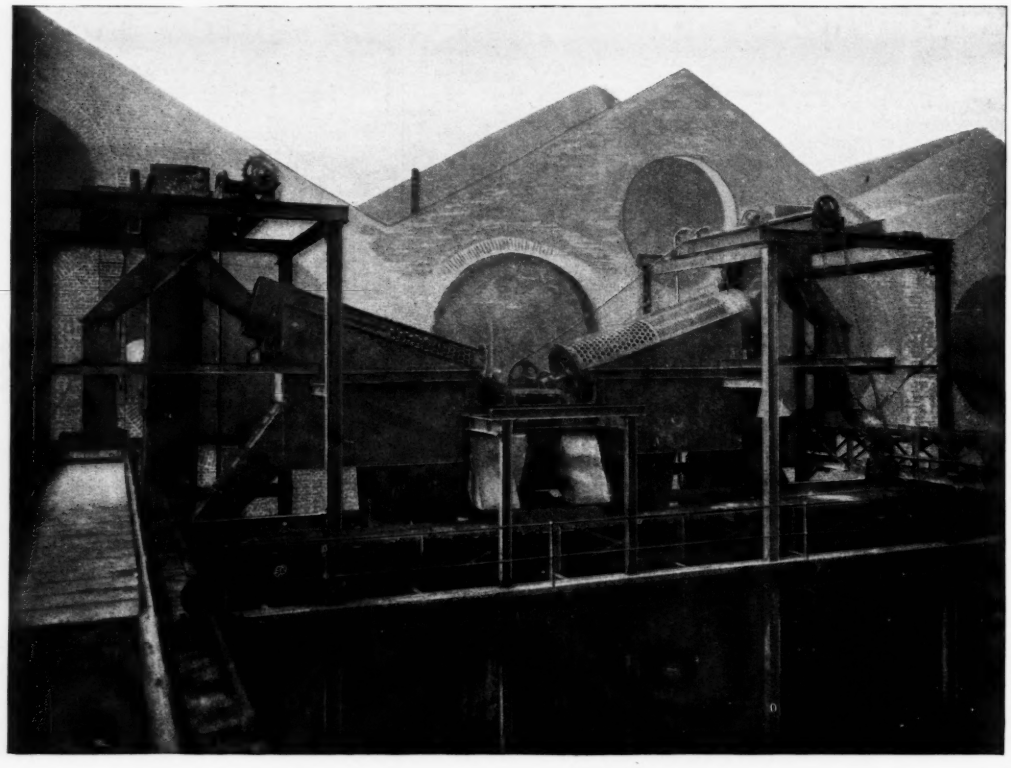
This is the scheme of the coke plant in outline; but now we will examine it a little more particularly. As was previously mentioned, there are three hot-coke conveyors. They are on Graham's patent, and are 243 feet centres. A few constructional details will be of interest. The trough is built of cast iron—the bottom plates being $\frac{3}{4}$ inch thick, with ribs 1 inch thick, the side plates $\frac{5}{8}$ inch thick, with ribs $\frac{3}{4}$ inch thick, cast in lengths of about 4 feet.

All the faces of the various plates where they join together are provided with chipping strips; and the plates are securely bolted together, and made water-tight—being well caulked with sal-ammoniac and iron borings. To the side plates running the full length of the retort-house are bolted the deflecting-plates for guarding the chain. These are secured by $\frac{3}{4}$ inch diameter bolts. There are two strands of steel chain to each conveyor; the chain being built up of manganese steel attachment links, with solid forged steel links each of 18-inch pitch, arranged in a suitable manner for giving a large wearing surface to the working points. Between each pair of links, and pitched 18 inches apart, are manganese steel rollers $4\frac{1}{2}$ inches diameter, supported on forged manganese steel pins. Bolted to the two strands of chain as distance pieces, and also to act as scrapers, are 4 in. by 4 in. angle-irons. The trough is covered its entire length with chequer-plates, with removable sections where required; and attached to the chequer-plates is a narrow gauge railway, which carries the

THE NEW CONVEYING PLANT AT THE MILAN WORKS OF THE UNION DES GAZ.



ELEVATION, SECTION, AND PLAN OF THE PLANT OUTSIDE THE RETORT-HOUSES.



Copyright.

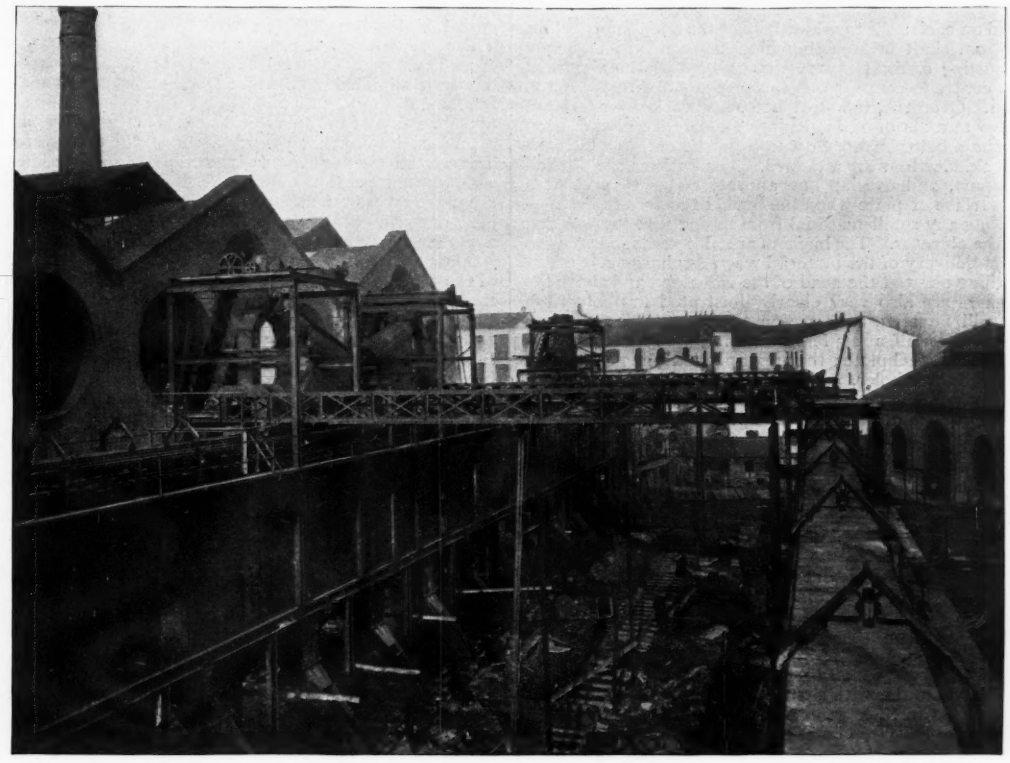
PHOTOGRAPH NO. 2.—AT THE HEADS OF TWO OF THE ELEVATORS, SHOWING BREECHES SHOOTS, SCREENS, CROSS CONVEYORS, &c.

travelling shoot used for conducting the coke from the retorts to the conveyor. The return chain is supported from the underside of the drawing-stage by angle-iron runners. The driving end consists of two large hexagonal drums fitted with renewable steel teeth, and keyed on a $4\frac{1}{2}$-inch diameter shaft, and is arranged at the end of the conveyor so as to allow the delivery end to be slightly raised in order to drain off any surplus water. There are two trailing shafts; and to each shaft is keyed a pair of drums, provided with large guides to keep the chain in position. The shafts are supported in bearings, which are provided with steel springs, in order to maintain an even strain throughout its working. At the end of each conveyor is arranged a shoot for delivering the coke into its respective elevator.

The three elevators (which are seen in photograph No. 1) are on the continuous bucket principle, with buckets 24 inches wide. The height of the elevator centre to centre of the sprocket wheels is 59 ft. $5\frac{3}{4}$ in. These elevators consist of a lattice built up framework, containing four 3 in. by 3 in. angle-iron runners,

Copyright.

PHOTOGRAPH NO. 3.—STEEL BELT CONVEYORS OVER COKE BUNKERS.



Copyright.

PHOTOGRAPH No. 4.—A GENERAL VIEW OF THE PLANT FROM ABOVE.

with stanchions of similar section; the frame thus formed being well braced by 2 in. by $\frac{3}{8}$ in. flat steel bracing, so as to form two substantial side girders, which are attached to one another by means of a back plate, which also guards the buckets on their return side. The four angle-iron runners are provided with greenheart wood liners, which are secured by counter-sunk bolts to the angle runners. The boot of the elevator consists of two steel side plates effectively stiffened by means of angle-rons, and carrying an angle-iron frame, which supports the bottom shaft, so that the shaft may be varied. The receiving-hopper which is attached direct to this boot is provided with an improved form of flap-door feed, which is so arranged as to automatically fill each bucket with coke as it moves forward. The top framing is finished off in a similar manner to the casing, and is provided with a breeches shoot for delivering the coke either into the screen or on to the cross-belt conveyors, which carry the coke to the storage conveyor in the yard. The top and bottom shafts are each $3\frac{1}{2}$ inches in diameter, with two sprocket

Copyright.

PHOTOGRAPH No. 5.—A GENERAL VIEW OF THE PLANT FROM THE GROUND LEVEL.

wheels keyed on each; the top shaft being supported in pedestals, and the bottom shaft in adjusting blocks, which are arranged with an adjusting screw for varying or adjusting the length of the elevator centre to centre so as to correspond with the pitch of the chain. Over the top and bottom sprocket wheels are stretched two strands of 12-inch pitch steel roller chain; each link of the chain being arranged with a special ear, to which the buckets and skidder bars are attached. The buckets are pitched 12 inches apart, and overlap one another, so as to present a continuous surface of plate when the bucket receives the coke—thus preventing any small material from falling into the working portions of the elevator. The buckets are also arranged so as to give a perfect delivery of the material when discharging.

The screening plant at the head of the elevators, and above the storage bunkers are also very clearly illustrated in photograph No. 2. As will be seen, they are on the rotary principle, and are 12 feet long over all, and 3 feet in diameter. The screens are built of perforated steel plate; the upper portion being perforated with 1-inch diameter holes, and the lower portion with 3-inch holes; the plates being rolled so as to form a cylinder, which is stiffened by T irons and angle-iron rings. Internally, there are also fixed two centres, which support a 3½-inch diameter shaft; the shaft projecting through, supported, and revolving in an inclined footstep, which is brass-bushed, and provided with steel wearing-pads at the bottom. The upper portion of the screen is supported by two roller bearings, as by this means the end of the screen is kept perfectly clear, and a good discharge is obtained from the elevator to the screen. At the lower end of the screen is bolted a bevel-wheel ring; and the motion is transmitted to the screen by means of a bevel pinion 9 inches in diameter. Under the screen are arranged the shoots for delivering the breeze and small coke into the respective coke-bunkers; the large coke being delivered on to the steel belt storage conveyor.

These belt conveyors, which are placed directly over the storage tanks, are 2 ft. 6 in. wide, with 231 ft. 5½ in. centres. [See photograph No. 3.] As in their general structure they are in every respect similar to the three cross conveyors [photograph No. 4] feeding on to the yard distribution conveyor [photograph No. 5], and to the latter itself, we may describe them together, with the preliminary statement that the distribution conveyor is 237 ft. 4½ in. centres, and is supported on trestles, and the cross conveyors are each 59 ft. 5½ in. long. The cross and distribution conveyors are 30 inches wide. Each conveyor is built up as follows: There are two lattice braced girders, forming the two sides of the conveyor, composed of 3 in. by 3 in. angle-steel runners, with 2 in. by ⅜ in. flat steel lattice bars, and 3 in. by 3 in. angle-iron stanchions; the ends being carried forward so as to support the driving and trailing ends respectively. The two girders that are thus formed are attached to one another by means of cross-bars and lattice-bars, so as to form a rigid framing. Attached to the angle-runners both top and bottom, are filbows supporting 1½ inch diameter steel shafts, with 6-inch diameter rollers; these rollers being used for supporting both the carrying and the return chain respectively. The rollers are arranged 3 feet apart, and support the conveyor plates clear of the angle-runners. The driving and trailing ends are built up of channels attached to the angle-iron runners, so as to form a self-contained frame; the trailing shaft being arranged with adjusting gear for regulating the length of the conveyor. The end shafts are each 3½ inches diameter; and each shaft is provided with two massive hexagonal drums suitable for 12 inch pitch chain. To each of the end shafts is keyed a 3 ft. 6 in. diameter spur wheel, driven by means of an 11 inch diameter pinion, mounted on a 3 inch diameter countershaft. This gear is arranged on each end of the conveyor, so that it may be driven in either direction when required, thus conveying the coke to any position in the storage bunkers. When it is remembered that there are three distinct inclined retort-benches—two benches of sixteen beds of nine 20 feet retorts, and one bench of sixteen beds of 15 feet retorts—it will be recognized what an important matter this reversing of the conveyors is, and how it will facilitate the filling of the exhausted bunkers and the distribution of coke to the most convenient parts of the storage yard when the bunkers happen to be full. But to proceed with the description, there are two endless strands of 12-inch steel linkwork stretched over the end drums. This chain is of a special design suitable for being driven in either direction; the teeth of the hexagonal drums being arranged so as to engage with the chain in whichever direction it is required to drive it. Attached to this double strand of chain are ¼ inch steel plates, 2 ft. 6 in. wide, joggled so as to overlap one another, as, by this means, they present a continuous travelling surface or tray.

Along the length of the storage or distributing conveyors are provided steel ploughs, 12 feet pitch; these being arranged in such a manner that they may be put to work with the greatest ease, or may be thrown out of gear as required. The ploughs consist of specially curved and bent plough blades fastened to a V-iron; the curve in the plates being so arranged as to push or plough the coke off the conveyors into the coke-tanks or the yard. Along the whole length of the distributing conveyors is arranged a gantry of $\frac{5}{16}$ inch steel chequer plate, 2 feet wide, complete with hand-railing and ladders.

The trestles are about 33 feet high, built up of two stanchions; each trestle consisting of two lengths of 3 in. by 3 in. by ⅜ in. steel angle, placed back to back, riveted together, arranged with four gusset plates, to which the cross-bars and bracing are attached. The cross-bars are of 3 in. by 3 in. angles; and the lattice bars or cross-bracing, 2½ in. by ⅜ in. flat. The foot of each leg of the trestle is supplied with a good stout foundation plate, which is attached to the legs by means of gusset plates and cleats. The upper portion of the trestle consists of two 6 in. by 3 in. channels, placed back to back, on which are fixed the conveyor and gantry. These trestles are 13 ft. 9 in. wide at the bottom, tapering to 3 ft. 6 in. wide at the top. The ends of the storage conveyors and the three cross conveyors are supported on trestles built up of rolled steel joist, and each of the three elevators and screens is supported in a similar manner by joist columns, well cross-braced.

The coke storing bunker, which forms such a prominent feature of the outside plant, requires little in the way of description; but it raises other points of interest. It will be a sufficient description to say that the bunker is 252 feet long, 12 feet wide, and 14 feet deep, arranged so as to deliver the coke on either side. Six portions of this bunker are divided off for the small coke and breeze; the remainder being used for the storage of the large coke. The sides are of ¼-inch steel plate; and the bottom of $\frac{5}{16}$ in. steel plates. The side and bottom plates are well stiffened by means of angle-irons, T-irons, and bracing; the bottom of the hopper being arranged so as to deliver the coke on either side. The bunkers are supported on rolled steel joist columns, spaced 14 feet apart. Also pitched 14 feet apart on each side of the bunkers are specially designed hinged shoots for filling baskets with coke (as is the local custom) or carts in bulk. At the same time, railway trucks can be filled from beneath the bunkers. But in connection with the railway trucks, we may make an interesting little pause. Their great diversity in design and size had to be allowed for in planning the new plant. The variety, as anybody is aware who knows anything about Italian rolling stock, is its peculiarity, and only such can fully appreciate the difficulties to be faced, and realize how impossible it is to expect to secure the equal automatic filling of all the different kinds of trucks used. Some of the trucks have still the old-fashioned guard-seat at the end; and therefore the height—varying as much as 8 to 14 feet—is too great to allow of the same arrangements in regard to filling as are common in England. Then there are many railway trucks of about 18 tons capacity, the only means of filling which are small doors opening outwards in the middle. The covered fruit trucks are also used for other than their legitimate purpose out of the season; and the totally dissimilar service of conveying coke is frequently their portion. These fruit trucks are more difficult to supply with coke than any of the others. The only means of access is by way of a sliding door covering an opening in the middle of the side of the trucks; and therefore all the coke falling into that door has to be raked to the end of the truck away from the opening. Manifestly this means the expenditure of much more labour and time than would be taken in the filling of ordinary English trucks. These are only examples of curious charactered waggons, to cope with which special means had to be devised. The task of providing for all these types of conveyances had its difficulties; but so far as they were conquerable, they have been met. It was arranged that small 10-ton open trucks should be supplied with coke from the openings underneath the bunkers; and, as there are three distinct lines of rails, three different sizes of trucks can receive their supplies at the same time. Incidentally, it may be mentioned that special attention has also been given to the permanent way, so as to enable horses and carts to pass over it and receive their supply from the bunkers without undue fatigue and trouble.

The power used for driving this large coke plant is gas. Each set of hot-coke conveying plant, elevators, and cross storage conveyors is regarded as a unit; and for this reason each has its separate gas-engine. Therefore, in this connection there are three engines of 35 brake horse power, and of Messrs. Crossley's make. These engines are suitably located and protected in the retort-house between the end of the benches and the gable wall. The power is transmitted from the engine by means of belt pulleys to a primary countershaft. From this countershaft, the power is transmitted to the hot-coke conveyor by means of a small vertical shaft and gearing. The power for driving the coke-elevator with its respective screen and cross conveyor is also taken from this same primary shaft, by means of a vertical shaft with direct gearing. For driving the storage conveyors, there are two 45 brake horse power gas-engines—one placed at each end of the yard; these being arranged so that any of the three storage conveyors may be driven in whatever direction is required, the conveyors being reversible. Each engine is capable of driving two of the three conveyors in the one direction; and by this means it can always be arranged that these long conveyors are driven from their delivery and not from the receiving end. The power from each engine is transmitted by belt gearing to the primary countershaft; and from this countershaft the power is taken by a vertical shaft to the respective conveyors.

This completes the description of the new coke plant at the Milan Gas-Works; and it indeed forms an interesting supplement to the article published last week on the large installation of inclined retorts. We hope that these new works at Milan will yield the good returns anticipated; and, under fair conditions, there is no apparent reason why they should not. The alacrity with which the Contractors handled the entire work so far from their centre of operations was a commendable feat; and it is pleasing to record the fact that the Gas Company have already

taken over the entire plant, and are now responsible for its proper working. We think, therefore, that Messrs. Graham, Morton, and Co., Ltd.—and in particular the active head of the firm, Mr. Maurice Graham—are to be complimented on the successful issue of their efforts in carrying out such an extensive contract in the face of considerable difficulties and limitations of time.

GAS UNDERTAKINGS RETURNS.

THE returns relating to the gas undertakings of the United Kingdom for the year ending Dec. 31, 1901, in the case of the Companies, and March 25, 1902, for the Local Authorities, were issued on Thursday, pursuant to an order of the House of Commons dated the 1st of May. The immediately preceding returns were published on the 13th of January, 1902, in compliance with an order made on April 2, 1901.

Particulars are furnished this year in regard to 705 gas undertakings, compared with 693 before—an increase of 12. The newcomers among the Companies are the Alfreton, Arlesey, Golborne, Harpenden, Leatherhead, Omagh, Petersfield and Selsey, and Swaffham. On the other hand, Devonport, Glastonbury, Honley, Newtown and Llanllwchaiarn, Ossett, Shipley, and Whitwick drop out—leaving an increase of one. The list of Local Authorities making returns is extended by the addition of Coalville, Devonport, Glastonbury, Honley, Newtown, Ossett, Rothwell, Scunthorpe, Shipley, and Winsford, in England, and Newport in Scotland. The amount of capital authorized for the 705 gas undertakings (including other purposes than gas supply in certain cases) is £125,651,948, of which £109,022,820 has been paid up and borrowed. The total receipts are: Companies, £17,955,187; Local Authorities, £9,300,567—total, £27,255,754. The total expenditure is: Companies, £14,537,797; Local Authorities, £7,630,856—total, £22,168,653. The statistics relating to working show that 14,102,629 tons of coal were carbonized; the number of cubic feet of gas made being 156,686,891,639, of which 144,058,556,176 cubic feet were sold, inclusive of 15,365,900,275 cubic feet of water gas and 89,355 cubic feet of acetylene gas. The totals in the preceding returns were: Coals, 13,906,288 tons; gas made, 152,007,811,487 cubic feet, of which 140.418,453,827 cubic feet were sold, including 12,108,452,109 cubic feet of water gas and 81,402 cubic feet of acetylene gas. The extended use of water gas is shown by the following figures, included in the totals of the gas sold by the Companies in the past four years: In 1898, it was 5,125,804,000 cubic feet; in 1899, 7,121,198,000 cubic feet; in 1900, 8,945,670,416 cubic feet; and in 1901, 11,410,279,017 cubic feet. The figures for the Local Authorities are: In 1898-9, 2,278,389,500 cubic feet; in 1899-1900, 2,955.828,210 cubic feet; in 1900-1, 3,162,781,693 cubic feet; and in 1901-2, 3,955,621,258 cubic feet. Acetylene gas was supplied to the extent of 82,500 cubic feet in the first-named year; it dropped to 75,239 cubic feet in 1899-1900; and afterwards rose to 81,402 and 89,355 cubic feet respectively in the next two years. At the date to which the last returns were made up, there were 28,285 miles of mains in use for the supply of 3,920,992 consumers and 614,096 public lamps. The preceding figures were: Miles of mains, 27,591; consumers, 3,713,289; and public lamps, 605,156.

Comparing the figures furnished by the present returns with those contained in similar returns for the previous nine years, it will be seen that the Companies show as follows:—

Year.	Share and Premium Capital Paid up.	Loan Capital Issued.	Capital Sold under Auction Clauses.	Premiums Realized.
1892. . .	£35,266,898½	£7,149,367	£4,755,597	£2,144,619
1893. . .	36,491,562½	7,544,563	5,417,667	2,432,970
1894. . .	37,059,199½	7,739,678	5,715,024	2,637,019
1895. . .	37,307,330½	7,888,086	5,974,455	2,779,604
1896. . .	41,433,325	8,185,710	6,783,468	3,512,818
1897. . .	42,368,976	8,891,218	7,248,545	3,405,345
1898. . .	44,134,488	9,360,293	7,786,216	3,995,781
1899. . .	57,937,016	11,451,134	10,031,384	4,301,820
1900. . .	59,638,877	11,775,642	11,030,474	4,867,124
1901. . .	62,775,845	12,201,533	11,815,348	4,701,958

Year.	Tons of Coal Carbonized.	Cubic Feet of Gas Made.	Number of Consumers.	Public Lamps Lighted.
1892. . .	7,119,189	72,178,028,396	1,213,322	288,021
1893. . .	6,995,125	71,050,955,154	1,225,253	296,910
1894. . .	7,128,126	72,610,842,498	1,266,943	295,787
1895. . .	7,531,131	77,245,618,489	1,339,712	302,015
1896. . .	7,681,770	80,015,323,004	1,439,272	308,180
1897. . .	7,963,465	84,040,175,901	1,549,627	314,451
1898. . .	7,958,669	86,705,722,752	1,670,847	319,007
1899. . .	8,321,187	91,794,898,282	1,817,649	324,166
1900. . .	8,426,853	94,869,749,232	1,945,825	326,813
1901. . .	8,580,365	97,386,618,553*	2,048,359	326,209

* Number of cubic feet sold, 89,685,208,319, including 11,410,279,017 cubic feet o water gas.

The somewhat similar figures for the Local Authorities are—

Year.	Amount Borrowed, including Annuities (not deducting Repayments).	Receipts.	Expenditure (exclusive of Amount in the next Column).	Interest, &c., Paid.*	Net Profit after Payment of Items in preceding Column.
1892-93 .	£22,734,556	£5,983,359	£4,702,179	£994,517	£305,040
1893-94 .	23,619,082	6,219,460	4,866,486	1,038,462	341,470
1894-95 .	24,624,554	6,402,046	4,681,035	1,114,014	622,366
1895-96 .	25,624,326	6,478,191	4,881,944	1,126,170	493,886
1896-97 .	26,561,689	6,639,342	4,989,283	1,136,789	534,390
1897-98 .	27,376,324	6,759,883	5,058,705	1,161,171	554,014
1898-99 .	28,614,971	7,177,670	5,365,995	1,219,771	625,780
1899-00 .	29,658,730	8,048,089	6,155,725	1,280,168	663,189
1900-01 .	31,509,701	9,121,418	7,463,693	1,353,259	409,802
1901-02 .	34,045,442	9,300,567	7,630,856	1,467,232	414,091

* These figures include: (1) Interest paid on loans; (2) amount paid for annuities; (3) amount of loans repaid; (4) amount paid for redemption of annuities; (5) amount placed to sinking fund.

Year.	Tons of Coal Carbonized.	Cubic Feet of Gas Made.	Number of Consumers.	Public Lamps Lighted.
1892-93. .	3,977,291	39,303,250,095	1,203,574	201,484
1893-94. .	4,025,167	39,730,833,247	1,226,332	210,316
1894-95. .	4,191,175	41,684,838,142	1,257,274	217,069
1895-96. .	4,406,315	44,176,134,202	1,320,059	224,873
1896-97. .	4,614,969	47,026,280,408	1,406,456	232,464
1897-98. .	4,652,688	48,652,558,526	1,475,749	239,352
1898-99. .	4,883,148	51,441,272,030	1,578,291	247,857
1899-00. .	5,289,501	55,360,659,139	1,667,908	257,040
1900-01. .	5,479,435	57,138,062,255	1,767,464	278,343
1901-02. .	5,522,264	59,300,273,086*	1,872,633	287,887

* Number of cubic feet consumed, 54,373,347,857, including 3,955, 621,258 cubic feet of water gas and 89,355 cubic feet of acetylene gas.

As in previous returns, particulars are furnished as to the nature and quantity of materials other than coal used for the manufacture of gas, the supply of water gas, and the maximum proportion of its admixture with coal gas. The extent to which oil, petroleum spirit, carburine, or "other material," is now utilized for the production of gas will be seen from the following list of Companies and Local Authorities who make returns in regard thereto:—

Companies.

Alliance and Dublin.
Alton.
Bath.
Bexhill.
Bournemouth.
Brecon.
Brentford.
Bridlington.
Brighton and Hove.
Bristol.
Canterbury.
Chigwell.
Cleethorpes.
Coatbridge.
Colchester.
Colney Hatch.
Commercial.
Croydon.
Crystal Palace.
Dartford.
Derby.
Dorking.
Dover.
Durham.
Eastbourne.
Epsom and Ewell.
Exeter.
Falmouth.
Faversham.
Folkestone.
Gaslight and Coke.
Godalming.
Gosport.
Gravesend.
Great Yarmouth.
Guildford.
Halesowen.
Harrow.
Hartlepool.
Hastings.
Hornsey.
Horsham.
Hoylake and W. Kirby.
Hull (British Co.).
Kingston-on-Thames.
Lea Bridge.
Liverpool.
Longwood.
Maidenhead.
Maidstone.
Mid Kent.
Musselburgh.
Newport (I.W.).
Newport (Mon.).
Northfleet.
North Middlesex.
Norwich (British Co.).
Plymouth and Stonehouse.
Portsea Island.
Preston.
Redhill.
Rochester.
Romford.
Scarborough.
Shrewsbury.
Southampton.
Southend.
South Metropolitan.
South Shields.
Staines and Egham.
Stretford.
Swansea.
Swindon.
Taunton.
Tonbridge.
Tottenham.
Tunbridge Wells.
Tynemouth.
Waltham Abbey.
Wandsworth and Putney.
Watford.
West Ham.
Winchester.
York.

Local Authorities.

Accrington.
Ashburton.
Alloa.
Alva.
Belfast.
Birkenhead.
Birmingham.
Blackburn.
Broughty Ferry.
Burnley.
Bury.
Carlisle.
Chorley.
Coventry.
Darlington.
Dumfries.
Dunfermline.
Edinburgh.
Glasgow.
Halifax.
Hebden Bridge.
Hereford.
Huddersfield.
Ilkeston.
Keighley.
Kilsyth.
Leeds.
Leicester.
Lincoln.
Llandudno.
Longton.
Manchester.
Middlesbrough.
Middleton.
Oldbury.
Oldham.
Paisley.
Peebles.
Perth.
Portsoy.
Ripon.
Rochdale.
St. Helens.
Smethwick.
Southport.
Stafford.
Stockport.
Stockton-on-Tees.
Tipton.
Todmorden.
Warrington.
West Bromwich.

The new names in the above lists are the Alliance and Dublin, Dartford, Gosport, Great Yarmouth, Mid Kent, Newport (Mon.), Romford, South Shields, and Stretford Gas Companies; and the Local Authorities at Accrington, Ashburton, Carlisle, Kilsyth, Leicester, Middleton, Oldbury, Oldham, Ripon, Smethwick, Stafford, and Todmorden. The Gas Commissioners of Portsoy have increased by half-a-ton the quantity of carbide of calcium used by them in the manufacture of acetylene gas; their return being now 11½ tons, and the quantity of gas made 103,040 cubic feet, of

which 89,355 cubic feet were consumed—65,931 cubic feet by private persons and 23·424 cubic feet for public lighting.

With regard to carburetted water gas, the returns show that when they were made up it was being supplied by the following Companies and Local Authorities; the maximum proportions of its admixture with coal gas (except where averages are stated) being given in parentheses:—

Companies.

Alliance and Dublin (39).
Bath (50).
Bexhill (42·03).
Bournemouth (25).
Brentford (40).
Bridlington (av. 33).
Brighton (40·66).
Colchester (24).
Colney Hatch (17·59).
Commercial (31·7).
Croydon (av. 32).
Crystal Palace (25).
Dartford (17).
Dorking (50).
Durham (25).
Eastbourne (20 to 30¹).
Epsom (43).
Falmouth (33·33).
Faversham (35).
Folkestone (33).
Gaslight and Coke.*
Gosport (not stated).
Guildford (25 to 33½).
Harrow (42).
Hartlepool (av. 16).
Hastings (av. 23·09).
Hornsey (41†).
Horsham (45).
Hoylake (27‡).
Hull—British (av. 48).
Liverpool (50).
Lea Bridge (about 40).
Maidenhead (av. 43).
Newport, Mon. (6·4)
North Middlesex (46·30).
Norwich—Brit. (51).
Plymouth (42).
Portsea Island (30).
Preston (44§).
Redhill (23).
Rochester (30).
Romford (not stated).
Scarborough (av. 22·1).
Southampton (30).
Southend (31·44).
Staines and Egham (20).
Stretford (33·65).
Swansea (25).
Swindon, New (35).
Taunton (35).
Tonbridge (20).
Tottenham (42·33).
Tunbridge Wells (30)
Waltham Abbey (n.s.).
Wandsworth.‖
Watford (26).
Winchester (30).
York (23·28).

* The Company supplied 3,809,477,000 cubic feet of water gas. Of the total quantity of gas sent out, 12 per cent. was unmixed with water gas. With regard to the remainder, 60 per cent. contained a maximum proportion of 19 per cent. of carburetted water gas, 13 per cent. a maximum proportion of 27 per cent., 7 per cent. a maximum proportion of 35 per cent., 10 per cent. a maximum proportion of 39 per cent., and 10 per cent. a maximum proportion of 41 per cent. † On an emergency. ‡ One day only. § Average for one week. ‖ Varies from 9·59 to 45·85 per cent.

Local Authorities.

Accrington (25).
Belfast (about 43).
Birkenhead (33·48*).
Birmingham (25).
Blackburn (25).
Burnley (50).
Carlisle (not stated).
Chorley (25).
Coventry (35·17†).
Edinburgh (11·77).
Halifax (34).
Hebden Bridge (8·6).
Leicester (av. 14).
Lincoln (33·50‡).
Longton (50§).
Manchester.‖
Middlesbrough (n.s.).
Oldbury (20).
Oldham (26).
Paisley (2·75).
Southport (41).
Stafford (33·12)
Stockport (26·73).
Stockton-on-Tees (19).
Todmorden (20).
West Bromwich (23).

* One day only. † For one week. ‡ In the daytime; none at night. § One day only. ‖ 33·74 per cent. at the Bradford Road station; 16·32 per cent. on the total output.

Eight new Gas Companies—Dartford, Gosport, Newport (Mon.), Romford, Staines and Egham, Stretford, Tunbridge Wells, and Waltham Abbey—appear in the above list; and Caterham has dropped out. The new Local Authorities furnishing returns are Accrington, Carlisle, Leicester, Oldbury, Oldham, Stafford, Todmorden, and West Bromwich.

GAS BILLS FOR 1903.

(*Concluded from p. 99.*)

THE following Bills, promoted by Local Authorities, relate wholly or in part to gas supply; beginning with the Bills for enabling Authorities to acquire the gas undertakings of Companies.

The Chard Corporation Gas and Electricity Bill is to authorize the Corporation to purchase the undertaking of the Chard Gas Company, in accordance with a provision made in the Company's Act of 1902. The area of supply is to be the borough and parish of Chard, in the County of Somerset. The Company are to sell, and the Corporation to purchase, the undertaking as by compulsion, without reference to the fact of the Company having obtained their Act of 1902. The Company are to be paid the taxed costs of this Act and of winding up; and to compensate employees for loss of emolument. The Act of 1902 is to be repealed as from the transfer. Additional lands are required. The price to be charged by the Corporation for 14-candle gas is not to exceed 3s. 11d. per 1000 cubic feet unless the price paid by the Corporation for coal delivered at either railway station in the borough shall exceed 20s. per ton. But it is not at any time to be more than 5s. per 1000 feet. Consumers' fittings may be specified. The rate of interest payable on consumers' deposits is to be 4 per cent. The sum of £15,000 is to be borrowed for gas-works extensions; all gas loans to be repayable in forty years. The reserve fund may amount to one-fifth of the aggregate capital expenditure. Surplus profits are to be carried to the district fund. Deficiencies of revenue are to be made good out of this fund by the rate made next or next but one after the deficiency is ascertained.

The Nantwich Urban District Council Bill is to empower the Urban District Council to supply gas and to acquire the undertaking of the Nantwich Gas Company, Limited, formed in 1869. The property is to be taken as by compulsion under the provisions of the Lands Clauses Acts; and the payment is to include the winding-up costs and compensation. No officer or servant who has been in the employment of the Company for "25 years or upwards" is to lose his right to compensation for refusing to continue in the service of the Council. Additional lands are required. The maximum prices for 15-candle gas are to be 5s. per 1000 cubic feet within the district, and 6s. beyond. Consumers' fittings are to be specified. Outlying portions of the undertaking may be sold to Local Authorities interested. The sum of £10,000 is required for gas-works extensions. All gas capital is to be repayable in forty years. Power is desired to grant a gratuity of any sum not exceeding one year's pay to disabled servants of the Council, or to the widow and family of such as die in the service.

The Rickmansworth Gas Bill is to empower the Urban District Council to purchase the undertaking of the Rickmansworth Gas Company. Ten per cent. is to be allowed for compulsory purchase; but regard is not to be had to the fact of the Company having obtained their Act of 1902. The actual costs of the Act and winding up are to be paid by the Council. The area of supply is to be the urban district and the parishes of Rickmansworth Rural and Chorley Wood. The price of 14-candle gas is not to exceed 4s. 7d. per 1000 cubic feet in the district, and 5s. beyond. Discounts on gas bills up to 10 per cent. for prompt payment and 15 per cent. for large consumption are proposed. Consumers' fittings may be specified. It is desired to supply outside consumers in bulk, and to exercise the road-breaking powers of the Act of 1847 for the purpose. Outlying parts of the undertaking may be purchased by the Local Authorities. Sums of £6000 and £2000 are required for gas-works extensions and working capital respectively. Any deficiency of gas revenue is to be made good out of the next district rate levied. The cost of opposing the Rickmansworth Gas Bill, 1902, is to be defrayed out of the capital.

The Shepshed Urban District Council Gas Bill is one for which no parliamentary notice was given. It is to empower the Council to acquire the undertaking of the Shepshed Gas and Coke Company, Limited. The limits of supply are to be the district and the parish of Garendon. Gas of 14-candle power, tested by burning it at such a rate as to yield the maximum light for which the burner is designed, is to be supplied at the maximum price of 5s. per 1000 cubic feet, with 10 and 20 per cent. discounts for prompt payment and large consumption respectively. Consumers' fittings may be specified. The sum of £10,000 is required for gas-works extensions. All gas loans are to be repayable in forty years. "No person entering into any contract with the Council for the supply of gas to him, or for any meter or apparatus to be furnished to him, or for any work to be done for him for the purposes of such supply shall thereby be disabled from being a member of the Council, or incur any penalty by reason of such contract; but any member of the Council concerned directly or indirectly by himself or any partner in any such contract shall not take part in any vote or proceeding relative thereto at any meeting of the Council."

The Wellington (Salop) Urban District Gas Bill is to empower the Council to supply gas and to purchase the undertaking of the Wellington Coal and Gas Light Company, who date from 1851. The payment is to include £150 towards the costs of the transfer and winding up. The Company are to keep all their cash balances and book debts due to them. The maximum prices of 14-candle gas are to be 5s. per 1000 cubic feet within the district of the Council, and 6s. beyond. Prepayment may be required for gas supplied for short periods. Consumers' fittings may be specified, with powers of inspection. In the case of supplies by prepayment meters, the Council are not to be deemed to have received the money until their collector shall have collected it, with any deficiencies. Outlying portions of the undertaking may be sold off to Local Authorities. The sum of £5000 is required for gas-works extensions, and £3000 for working capital. Gas loans are to be repayable in 45 years.

The Birmingham Corporation Bill contains a part relating to gas. It is to enable the Corporation to acquire additional lands at Erdington for gas-works purposes. Power is also sought for the Corporation to light "private streets" within the city, which powers are to be supplementary to any they may already possess. Section 15 of the Gas-Works Clauses Act, 1871, is to be locally amended by substituting the word "person" for the word "consumer" in the first line of the section. For the erection of gas-works at Erdington, and for other gas-works purposes, the sum of £500,000 is required, repayable in forty years. All the money to be authorized by the Bill may be raised either by the creation and issue of Birmingham Corporation stock or by mortgage. Further arrangements are proposed for dealing with the Birmingham gas annuities.

The Bradford Corporation Bill contains a part relating to gas. The Corporation propose to mutually purchase or sell so much of the undertaking of the Shipley Urban District Council as is within the city or the district respectively, on such terms and conditions as may be agreed upon. Such sale may be carried into effect by way of exchange, with a money payment to equalize the deal. The price of gas in the part or area of supply lying within the city is to be the same as that for the rest of the city. The Corporation also require general additional gas powers, including the usual provisions of the Model Bill. Additional gas lands are required. New gas loans for carrying out the arrangements of the Bill are to be paid off in thirty years.

The Gaslight and Coke Company's Acts Amendment Bill is promoted by the London County Council with the object of altering the standard price of the Company's gas, to reduce the standard of illuminating power, and to make provisions with respect to a capital redemption fund. It is proposed, as from Jan. 1, 1904, that the illuminating power of the Company's gas

shall be 14 instead of 16 candles, tested in accordance with the provisions in force under the Company's Act, 1876. The standard price to be reduced at the same time to 3s. 1d. per 1000 cubic feet. The sliding-scale is to work half-yearly in the proportion of 1s. 4d. per cent. on the ordinary stock for a penny in the price of gas. Section 16 of the Gaslight and Coke Company's (Capital Consolidation) Act, 1898, is to be amended by altering 4s. 9d., wherever this occurs, to 3s. 10d., and 2s. to 2s. 8d. Gratis "governed burners" are to be supplied to consumers on demand, and compulsorily in the case of slot-meter consumers. A redemption fund is to be formed out of one-half of the divisible profits in excess of 4 per cent. (being equal to the old maximum 10 per cent). The reserve fund is not to be used for distributing dividends in excess of the same maximum.

The London County Council (General Powers) Bill contains a clause to repeal section 6—description of burner for testing illuminating power—of the South Metropolitan Gas Act, 1900.

The North Western Electricity and Power Gas Bill is a measure forming a class by itself. Its purpose is to incorporate a Company, with a capital of £1,500,000 and power to borrow £500,000, with the objects of producing and supplying electricity, power gas, and sulphate of ammonia within a large area, including the whole of Cheshire and parts of Staffordshire, Derbyshire, Flintshire, and Denbighshire. The generating stations are to be at Sutton, in the rural district of Runcorn; at Stone, in Staffordshire; at Bollington, in Cheshire; and in the rural district of Wrexham, in Denbighshire. The power gas is not to be used for purposes of illumination. Special provisions are proposed for the routes of mains. Power gas is to be supplied to owners or occupiers, within 100 yards of a main, who will agree (if required) to take not less than 1,000,000 cubic feet per quarter for two years. The supply may be measured by a proportional meter. The maximum price of power gas to consumers of less than 4 million cubic feet per quarter is to be 4d. per 1000 cubic feet, with an addition of ⅛d. per 1000 cubic feet whenever the price of "good quality slack" exceeds 6s. per ton delivered at the works, for every 1s. of such excess. The gas is not to contain more than 14 per cent. of carbon monoxide, and must have a distinctive and readily perceptible smell. Testing places for thermal power and carbon monoxide are to be provided at the works. The heating power of the gas is to be not less than 125 British thermal units per cubic foot. No monopoly is to be created. The compulsory land powers are not to be exercised before £100,000 of capital has been subscribed. Money may be lent by the Company to intending customers, to an amount not exceeding £50,000. The prices of power gas may be revised by the Board of Trade at intervals of ten years. One-third of any excess profits over 10 per cent. is to be applied to cheapening the supplies, by way of rebate. Interest out of capital is to be payable during the construction of works, at the maximum rate of 4 per cent., and £60,000 in amount.

The Newcastle-upon-Tyne Electric Supply Company, Limited, and the Walker and Wallsend Union Gas Company are promoting a Bill for the transfer of the electricity undertaking of the Walker and Wallsend Union Gas Company to the former Company. The consideration for the transfer is payment of £2500, and 7009 ordinary and an equal number of fully-paid preference shares of £5 nominal. The electricity capital of the Walker Gas Company is in 7009 shares of £10 fully paid, which is to be extinguished. A sliding-scale of price and dividend is proposed, whereby after 5 per cent. is paid on the ordinary capital, an addition of 5s. per cent. may be distributed for a reduction in price of ¼d. per unit of electricity. Special mainlaying powers are required. Agreements between the Gas Company and the Walker District Council are scheduled; and with the completion of the transfer, the Company relinquish their electricity supply business, and their statutory powers in this regard are to be repealed.

The Law Relating to the Pollution of Rivers.—We have received a book on the above subject by Mr. J. V. Vesey Fitzgerald, K.C., and published by Messrs. Knight and Co. The author has collected therein the statutes and cases bearing upon the question of river pollution in such a form as to enable those interested to ascertain the law bearing on points that may arise, and appreciate the changes effected by modern legislation. We shall notice the work more fully in an early issue.

Artesian Wells in London.—Messrs. Alfred Williams and Co., of Bow, have just completed, at Salisbury House, London Wall, two artesian wells for the supply of the building. The boreholes are 7¼ inches in diameter and 450 feet deep. After 146 feet of clay had been penetrated, a bed of grey sand 56 feet thick was met, below which were strata of chalk and flints to the thickness of 248 feet. Below these the springs were struck. Storage is provided at the top of the building and also in the basement.

Luminous Paint.—Although this material is less heard of now than it was a few years ago, its utility for certain purposes has by no means diminished. As it is sometimes difficult to procure, "La Nature" recently gave the following formulæ for making it, the figures representing parts of the ingredients: (1) Yellow paint varnish, 25; sulphate of barium, 5; ultramarine, 6·4; cobalt blue, 5·4; sulphide of calcium, 17. (2) Blue varnish, 42; sulphate of barium, 10·2; ultramarine, 6·4; cobalt blue, 5·4; sulphide of calcium, 46.

TRADE IN 1902.

THE history of British trade during all but the first two or three months of last year has for its most prominent feature the influence of the situation in America. As early as March last we advised our readers to keep a watchful eye upon events there if they wished to understand fully, and be able to anticipate in some measure, the course of affairs on this side of the Atlantic. The extraordinary demand for iron and steel in the States, leading to a proportionately heavy consumption of coal, resulted, when the strike of coal miners took place, in a shortage of fuel—which has not yet been made good—and also in a large inflow of foreign iron and steel into America, which still continues. British trade has been affected therefore in more than one direction by the American situation. Exports of coal to the United States have been increased to a quite abnormal figure; while exports of coal to other countries in which American coal has in recent years been replacing British, went up in consequence of the withdrawal of the former from the market. During the eleven months ending November, the exports of coal from the States fell 1,231,000 tons below the corresponding figure for 1901—nearly 200,000 tons of the decrease being accounted for by a drop to that extent in the exports to France. The following table shows how British exports of coal compare with former years:—

Exports of Coal, Coke, and Patent Fuel.

	1900. Tons.	1901. Tons.	1902. Tons.
Coal, &c., exported for sale	46,098,228	43,765,912	44,897,947
Coal shipped as "bunkers"	11,752,316	13,586,833	15,148,015
Total shipments	57,850,544	57,352,745	60,045,962
Value of sales	£38,619,856	30,334,748	27,581,176
Realized per ton	16s. 9d.	13s. 10d.	12s. 3d.
	Tons.	Tons.	Tons.
Exports to United States (included in above)	55,730	130,816	880,422
Exports of coke (included in above)	985,365	807,671	687,548
Realized per ton	24s. 8d.	17s. 4d.	16s. 0d.

It is noteworthy that France, who is our largest customer for coal, took last year, in spite of the stimulus given to our exports by the French miners' strike in the autumn, 249,000 tons less than in 1901, and 1,035,000 tons less than in 1900, while Holland imported 335,000 less than in 1901, and 1,142,000 tons below the 1900 record. These decreases are apparently to be ascribed in part to the coal-tax, which has enabled German coal, mined near the frontiers, to penetrate further into the two countries in question. Owing, however, to the great influx of German iron and steel into this country, and the extremely low return-freight rates consequently ruling, British coal practically maintained its position in Germany itself last year; the exports to that country amounting to 5,835,644 tons, as compared with 5,854,446 in 1901, and 5,985,161 tons in 1900.

The following comparison of prices (market quotations), taken from the "Colliery Guardian," shows that coal rates have been maintained during the year in a manner far exceeding anyone's expectations twelve months ago:—

	Prices per ton. Jan. 1, 1901.	Jan. 1, 1902.	Jan. 1, 1903.
Coal.			
Best Northumbrian steam, f.o.b. Tyne	13s. 10d...	11s. 3d...	11s. 6d.
,, ,, smalls, ,,	7 0 ..	5 9 ..	5 8
,, Durham gas, f.o.b. Tyne	12 4 ..	12 6 ..	10 0
Barnsley thick steam house, at pit	14 3 ..	13 9 ..	13 3
Best Cardiff steam, f.o.b. Cardiff	20 3 .	16 3	14 6
Scotch splint, f.o.b. Glasgow	12 6 ..	10 9 ..	10 9
Coke.			
Best Durham foundry, del'd. Teeside	17 6 ..	17 0 ..	16 2
Freights.			
Tyne to Hamburg	4 2 ..	4 0 ..	3 6
,, ,, London	3 3 ..	3 3 ..	3 2
Cardiff to Genoa	7 9 ..	5 0 ..	5 10
,, ,, London	3 10 ..	4 4 ..	3 10

The wages rates in the various coalfields, which follow prices at a greater or less distance according to the method by which adjustments are brought about, show a reduction in every case during the year. But in South Wales and the Federated districts they have not yet fallen to the level at which they stood three years ago. The following table shows how matters stand at present:—

Percentages of Wages above Standard.

District.	Jan. 1, 1900.	Jan. 1, 1901.	Jan. 1, 1902.	Jan. 1, 1903.
Northumberland	25	61¼	30	26¼
Durham	33¾	65	36½	33¾
Federated counties	40	50	60	50
South Wales	30	73¾	66¼	48¾
Fife and Clackmannan	53¾	97½	47½	41¼
West of Scotland	56¼	100	50	43¾

Business in the finished departments of the iron and steel trades was decidedly quiet during last year; being hindered partly by the higher price of raw material consequent upon the demand from America, and—especially towards the close of the year—by the slackening of work in the shipbuilding yards. That the volume of orders from the States did not more seriously increase the price or cause a shortage in the supply of iron, was due to the importation of large quantities of German and Belgian

iron into the British markets, coupled with the ample margin of plant not in blast, which would have been brought into work speedily had the demand warranted a greater output. At the beginning of the year, there were 341 furnaces in blast; by the end of September, the number had risen to 347, but fell again by Dec. 31 to 338. In 1900, the number was over 400.

The course of trade with foreign countries, and the important part played therein by the United States, is shown in the following table:—

Iron and Steel.

		1900.	1901.	1902.
Export to all countries . . .	Tons	3,540,689	2,897,719	3,579,104
Imports from all countries . .	,,	799,675	923,623	1,133,147
Net exports to all countries.	Tons	2,741,014	1,974,096	2,445,957
Exports to United States. . .	Tons	133,211	146,815	669,768
Imports from United States . .	,,	335,217	155,202	40,511
Net exports to U. S. . .	Tons	— 202,006	— 8,387	629,257

Comparing 1902 with 1900, it will be seen that the reversal of the flow of iron across the Atlantic from eastward to westward caused the demand for iron and steel in this country last year to be 831,263 tons greater than it would have been had no such change occurred. A more striking instance of the influence that the United States is bound to exert upon the markets of the world in the future could not be desired. But for the great change in the relative position of supply and demand in America that has occurred since 1900, the iron and steel trades in this country would be to-day in a sorry plight; while that of these trades in Germany would be still worse. The present state of affairs in the States is certain to be changed as time moves on; for, even if demand does not slacken—which it is practically sure to do—the supply will increase rapidly in the course of a few months. When the exports of coal, iron, and steel from here to America fall again to the level of 1900 and 1901, and the depression in the shipbuilding trade is felt to the full, the position of these trades will be very different from the present. As it is, prices in the iron markets have already receded from the level to which they rose during the year, and, while raw material is still somewhat dearer than it was twelve months ago, manufactured goods are lower than for some years past. We take the following figures from the "Iron and Coal Trades Review."

	Prices per Ton. Jan., 1901.	Jan., 1902.	July, 1902.	Jan., 1903.
Pig-Iron—				
No. 3 foundry, Middlesbro' .	50s. 0d.	43s. 6d.	51s. 0d.	47s. 0d.
Scotch warrants	57 5	55 7	56 9	53 4
,, hematite	65 2	56 4	60 5	58 0
Welsh ,, ...	80 0	60 0	63 0	60 0
Manufactured iron—				
Marked bars	190 0	170 0	170 0	170 0
Common bars	160 0	140 0	135 0	130 0
Steel—				
Ship-plates, Glasgow. . .	135 0	122 6	117 6	117 6

The imports of "illuminating" petroleum last year show a large increase over previous years—America benefiting most by the greater demand. The cost was relatively considerably lower than the past two years. We give the figures for the three years.

Imports of Illuminating Petroleum.

		1900.	1901.	1902.
From Russia	Gallons	76,797,903	69,732,769	78,827,051
,, United States	,,	127,881,234	136,525,182	156,670,538
,, Other Countries	,,	10,589,343	10,951,650	10,431,372
Total	,,	215,268,480	217,209,601	245,928,961
Value		£4,365,770	3,938,320	4,020,319

Coal products exported show a slight increase in value compared with 1901, but a large decrease as compared with 1900; the figures being: 1902, £1,198,838; 1901, £1,151,253; and 1900, £1,811,644. Beyond these bald totals, the Board of Trade returns give no particulars. The returns might usefully be amplified in this respect. The exports of cement, in the manufacture of which so much coke is used, show a slight falling off in quantity from the 1901 figures, and a bigger drop in value. Compared with 1900, there is a fall of 15 per cent. in quantity and of 23 per cent. in value. The imports of chemicals, dye stuffs, &c., show an increase in value last year of £3564 over 1901, and £572,269 over 1900; the total for 1902 amounting to £6,133,062—a standing reproach to the enterprise of chemical industries in this country.

Taken as a whole, the returns for 1902 indicate great soundness in the general trade of the country. We purchased from foreign countries and our own colonies and possessions last year no less than £528,860,284 worth of imports—an increase of £6,870,000 over the previous year, and of £5,785,000 over 1900, when prices were much higher. And, despite lower prices, our exports realized £1,486,000 more than in 1901 (reaching a total of £349,350,000), and only fell short of 1900 by £5,023,000, in spite of coal realizing £11,039,000 less. The difference between the value of our imports and exports of about £180,000,000 represents dividends on British capital invested abroad and in the colonies, *plus* the value of services rendered by British shipping to foreign countries. This is a fact that our "protectionist" friends can never be made to understand. They think, or pretend to think, that we lose the difference. In spite of their pessimistic manipulation of figures, we venture to think that the trade statistics of 1902 are eminently satisfactory from a citizen's point of view.

MUNICIPAL TRADING AND LOCAL RATES.

The great cause of reducing to something like rational system and intelligible order the local government finance of the United Kingdom is only to be advanced by dogged perseverance in keeping the facts and the correct inferences from them prominently before the public. In order that this purpose may be attained, the co-operation of a sufficient number of newspapers and journals is necessary, because the opposite side—the side that affects to believe in the virtue of every kind of municipal extravagance—has plenty of support from notorious politicians and the Progressive press. For this reason, the incalculable service rendered to the ratepaying public by "The Times" exposure of the trend of Municipal Socialism needs following up by fresh efforts from time to time. Only in this way can the subject be kept fresh in the memory of a public which is daily fed with new sensations, and is only too glad to lose sight of the rate collector between his periodical visits. In pursuance of this policy of hammering away on the same place, "The Times" of the 9th inst. contained a weighty communication from an actuarial correspondent respecting the vexed question of the connection between municipal trading and municipal indebtedness and rating. It is the beginning and the end of the Progressive case for municipal trading, that the results benefit the municipal exchequer. There is no other justification for the so-called "principle," which others call less respectfully a fashion, or a fad. Again and again the ratepayers, and their parliamentary representatives who have not given their minds to the study of the subject, are treated to what purports to be evidence of the extent to which local rates are "relieved" by profits of trade, according to such statements as that of Mr. James Carter, the Borough Treasurer of Preston.

In our own particular sphere of influence, which happens to cover the most profitable of all kinds of municipal trading, we have always endeavoured to hold the balance fairly, and while acknowledging the generally successful character of municipal gas and water supply, have still maintained that the true measure of the expediency of this order of supplies is not the amount of the profit taken from such undertakings in aid of the local rates. This is, obviously, the precise contrary to the Progressive view. Not to pursue this particular line further, let us turn to what "The Times" correspondent has to say concerning the general question of fact, as to whether in reality local rates are relieved by the so-called remunerative undertakings of local authorities. It is a difficult question to answer. There are so many considerations involved in it. Of course, there is a simple and easy way of arriving at a reply satisfactory to the Progressive inquirer who only wants to be confirmed in a preconceived view. This is, to take whatever "profits" are claimed on paper for all the remunerative undertakings and properties of a local authority—down to the hire of boats on the ornamental water of a pleasure park—and work it out on the basis of the equivalent in rating. But a sound conviction is not to be arrived at in this way. As the writer under notice very properly remarks, "if municipal trading is so advantageous a thing as its advocates assert, its beneficial results ought to be traceable, if one allows it a reasonable time and a reasonable area for its operations." Accordingly, he has taken a period of 14 years, which covers the greatest activity in local government affairs, and put together the financial circumstances of 35 representative municipalities in all parts of the country. He has tabulated, in these cases, the amounts of municipal debt for remunerative works in 1886-87, and also in 1890-91; setting opposite to these figures the amounts of the municipal rates in the pound of assessable value (excluding poor rates) and showing the actual percentage increases or decreases in the rates. Another table gives the total outstanding debts of these towns, their assessable value, debt per head of population, and proportion of debt to assessable value.

We cannot reproduce these tables, but, having indicated where they are to be found, must confine ourselves to shortly stating some of the salient facts. The first thing that strikes one in looking at them is the wide differences existing between the financial practice of the various corporations. It may be merely a figure of speech to say what is the value of an inhabitant to the community counting him in with its population. But there is an enormous discrepancy, for instance, between the amount borrowed per head of every man, woman, and child in Huddersfield and in Bristol. The former town owes £31 10s. per head of its population, and the latter £4 per head only. Bristol has a debt amounting to 87 per cent. of the assessable value; while Huddersfield owes 650 per cent. upon it. Bolton has actually decreased its debt; and prominent among the more lightly indebted are Cardiff, Newcastle-upon-Tyne, Portsmouth, and Sunderland. It is difficult to resist the impression that those communities which have kept their indebtedness low must be able to look out upon the future with more confidence than others—especially the single-trade towns—that have already plunged so deeply into debt.

This consideration leads immediately to the point relied upon by the Progressives—that the increase in the amount of the outstanding indebtedness of most towns is due to the growth of municipal works of a remunerative character, and that the value of these works is an asset which should be set against the paper debt. This is a perfectly legitimate contention; and if it were certain that municipal trading is, as a whole, really remunerative—that is, productive of dividends for the ratepayers in the form

of reduced rates—most people would regard the subject of municipal indebtednes with different feelings. But, says the actuary, "we are a long way from being satisfied that the investment of capital in this way is good business either for the municipalities or the country generally." He argues that the vast majority of ratepayers, and of the borough councillors who trade in their name and on their credit, are not political doctrinaires, but plain people who embarked in these developments of municipalism as a simple matter of business. "They believed that municipalities, by owning and working gas-works, water-works, tramways, telephones, and so on, could supply a better and a cheaper service than is given by joint-stock companies, and could also reduce the rates by means of their profits. Even if there were no direct profits, they have felt that a better supply of the ordinary necessaries of town life would indirectly lighten the rates by increasing the value of the property to be assessed." This remark covers, it is to be presumed, the ultimate benefit to a town of the cheapest possible public supplies and services, rendered at cost price. Then, it is concluded that, unless the immense borrowing of municipalities for the purpose of trading does result in a decrease of rates either directly or indirectly through an enhanced assessment, "the outlook must be ominous, since no municipality can go on for very long piling up its debt and also increasing its local rates."

The question thus becomes concentrated into the following query: "Have those municipalities which for several years past invested more and more money in remunerative works been able to decrease their rates, or have they not?" The answer given by the tables under notice is that, with rare exceptions—only in three cases out of the 35 towns—the rates have gone up. The bright exceptions are Bolton, Hull, and Liverpool. Consequently, the palm of prudent husbandry of the municipal estate goes to Bolton. "Bolton's debt has been increased with moderation, a good deal more slowly than the growth of population and rates in the borough, and the rates have come down by 22 per cent." Honour to Bolton, therefore, "coupled with the name" as a toastmaster would say in the circumstances, "of Alderman Miles, for his administration of the Corporation gas estate!" It cannot be a mere coincidence that Bolton, Hull, and Liverpool have been moderate borrowers. If these were typical examples of municipal enterprise, the thing would have a better name; but they are, on the contrary, almost glaring exceptions to the general rule. "Look at Halifax. The debt has increased from £16¼ a head to £21¾; the proportion to rateable value has advanced from 424 per cent. to 528 per cent.; and the rates have gone up by 21 per cent." Huddersfield is far worse. Other towns are nearly as bad. "The position of Oldham is serious. The rates have gone up by 163 per cent. on a much smaller assessment, and there has been a large increase in the outstanding debt—that is to say, while the debt has increased, the security for it has diminished." The *crux* of what passes for Progressive Municipalism clearly appears in the cases of Sheffield and Stockport. The Sheffield debt, mostly classified as being remunerative, has advanced from 89 per cent. of the rateable value in 1886-87, to 410 per cent. in 1900-01; and the rates have, during the same period, gone up by 46 per cent. The Stockport debt has advanced from 78 per cent. of the rateable value of the borough to 485 per cent.; while the advance of the rates has been 34 per cent. The conclusion is that "if the principles upon which the so-called remunerative expenditure was incurred in these boroughs were sound, there should surely not have been this great simultaneous advance in local rates."

Of course, it is notoriously difficult to make absolutely comparable deductions from the statistics of local rating. Many considerations have to be taken into account before any one competent for the task could pronounce definitely as to which of two or more named places is the cheapest to work or to live in. What municipal corporations have to constantly bear in mind is that there is a large moveable population ever alert to this broad deduction. The hare-brained Progressives of the platform or the the Press may hail with well-feigned jubilation every increase of municipal indebtedness or expenditure; but these are not they who will pay for it. Municipal progress in the way of deliverance from the clutches of the money-lender would be progress indeed; but there are few examples of it. The mischief is the tendency is all the other way. Now, this cannot go on for ever.

All readers of the "JOURNAL" experienced in the municipalization of gas supply are familiar with the hackneyed argument of the cheapness of local authorities' loans. Of late years the song has changed its burden, and people have awakened to the consciousness that municipal loans are not cheap, but are really dear. This is how the discovery has been made: "There are probably few things more seductive to a municipality or a government than borrowing money for the construction of productive works; and there are few things more dangerous unless the the greatest financial judgment is shown. If works are constructed entirely out of borrowed money—as they must be in the case of municipalities—they start in life by being mortgaged up to the hilt. The interest and redemption of the capital sunk in them marks in practice almost the limit of their earning powers, and the service of the debt must be met whether there is net revenue available or not. An ordinary trading company, whose property is mortgaged to the extent of one-third, or even one-half of its nominal capital, can, during its early stages or in a bad year, forego interest altogether on the shareholders capital, which forms the bulk of the money invested, and can build up a reserve fund which will provide against evil days in the future. A trading municipality has no such elastic powers." Whatever happens, the service of the debt must be met; and if the revenue is insufficient, the rates must make good the deficiency. But fear of the ratepayers operates to prevent so straightforward a course. All manner of devices are resorted to in order to cover up the deficiencies of what are supposed to be remunerative undertakings. "There is a tendency to bleed consumers, notably in the case of municipal gas-works." Proper provisions for renewals and depreciation is not made; and there is always the danger of manipulation of the book-keeping in order to transfer expenses from the remunerative works to those which are called unremunerative. "Municipalities find it hard to confess that the works from which they hoped so much have merely added to their burdens." It is unnecessary to name the places that have furnished the material of this reflection. The onus of proof of the expediency of municipal trading now lies upon the believers in it.

ELECTRIC LIGHTING MEMORANDA.

The Hewitt Light—Its Character—Is the Efficiency Determined by Deceptive Measurement?—Case as to the Continuity of Electric Power Supply.

THE event of the week in electric lighting technics has been the show of the Hewitt mercury vapour lamp at the London offices of the British Westinghouse Company, which was briefly mentioned in last week's "Editorial Notes." Anyone who happens to be in London just now, and passes along the eastern end of the Strand, can see this light of an evening shining through a large ground-floor window in the Norfolk Street front of this handsome building, which is otherwise conspicuous by its display of Bremer arc lamps. As already stated, the Hewitt lamp is at present of no practical use for ordinary lighting. It is to all appearance a very lively form of Geissler tube light; and the shorter lamps suggest a boiler water-tube struck by lightning. The colour of the light is a vivid violet, in which all daylight tints are lost. Yellow is green, and red is black. This comes, of course, of the fact that the radiation is nearly all in the violet end of the spectrum, and is almost a realization of the dream of a light without heat, which is thus shown to have its own drawbacks. The source of the light is incandescent mercury vapour in a vacuum, and therefore inconsumable. It is stated that tubes of this character have been run continuously 200 days for ten hours a day, and their life is practically limitless. The efficiency is very high—as much as a (spherical) candle power for one-third of a watt consumption under favourable conditions.

Apart from the quality of the light as regards colours, it possesses some remarkable recommendations. The source is diffused, the surface intensity being rated at $\frac{1}{20}$ that of an incandescent electric lamp filament, and $\frac{1}{8000}$ that of the carbon arc. It can therefore be looked at with the naked eye without much dazzling; although the tremulousness of the radiation, which gives one the impression that it is working very busily, attracts notice at first. The present idea is, we understand, that the lamps can be profitably used to light underground railway tunnels, for which purpose it is assumed that cheapness is everything, and colour a matter of indifference. All the same, a railway journey by this light would be a weird experience. One's fellow travellers would exhibit a freakiness of complexion and attire reminiscent of the somewhat mad exercises in paint of M. van Beers. It is stated, on grounds that one would not like to take for granted, that this light, being all actinic, is pleasant to work by; and draughtsmen are reported to like it. We should not care personally to try the experiment for any length of time. We should be afraid of "seeing red," by reaction. The light is also recommended as a substitute for sunlight in this insular climate of ours, being credited with remarkable cabbage-raising powers. It is a chance for the market gardeners who are putting so much of England under glass.

The Hewitt lamps can be made of any size (and consequent power), from $\frac{1}{8}$ inch in diameter and 3 inches long, to 3 inches in diameter and 12 feet long. The luminous tubes can, of course, be placed in any position, and made of any shape. They should offer great facilities for illuminations of a novel kind. As regards the duty claimed for this light for current consumed there appears to be a little ambiguity, such as electricians hailing from the United States have fallen into before. "French measurement," we do not forget, was one of the Brush inventions; and not the least serviceable in its day. Now here, one would naturally suppose that, when the efficiency of the Hewitt lamp is in question, the figures given, from $\frac{1}{4}$ to $\frac{1}{2}$ watt per candle, would apply to the ordinary photometrical intensity of the light source. It is casually mentioned in the "Electrician," however, that this efficiency is "per spherical candle power," and so we have already given it. The same principle of measurement is repeated by the "Electrical Review." Both accounts are evidently supplied by the proprietors of the lamp; and our contemporaries do not see the mistake into which they have fallen. What is "spherical candle power?" It should mean, if it has any meaning at all, the sum of all the radiations of a point-source of light in every direction. Photometrically, only one radiation, usually in the horizontal direction,

is measured; and this is what is meant by the illuminating power of commercial lights. To convert ordinary illuminating power into "spherical" illuminating power, it is therefore necessary to multiply the one measurement of radiation by the figure representing the surface of the sphere of which it is a simple radius. The surface of a sphere of radius 1 is 12·6. Therefore, the spherical illuminating power of one actual photometric candle is 12·6 candles, which is also called, in the language of photometry, the "total intensity." (See on this, Palaz and others.) Obviously, if this is what the Westinghouse people mean by using the term in connection with the Hewitt lamp, the high efficiency claimed for this device disappears. If they do not mean it, why introduce the term at all? We present the dilemma to our electrical contemporaries for them to deal with as best they can. Meanwhile, the deliberate employment of this ambiguous language, to say nothing more, suggests the greatest caution on the part of the public in accepting the Hewitt lamp at the efficiency reported. The world of light users does not want another kind of false measurement in American photometry.

An instructive case in respect of the law and practice of the distribution of electric power recently came before the Judge of the Bristol County Court. A firm of vinegar brewers had contracted for the supply of electric power from the Corporation, for use in the business. The supply proved to be liable to sudden and unexpected interruptions, and as the result of one such interlude a brew of vinegar was spoilt. The Corporation were sued for the amount of loss sustained by their customer, and pleaded that they were not bound to supply continuously. Strictly speaking, this appears to be the correct view, because otherwise the briefest intermission for the purposes of making fresh connections or any other reasonable service of the undertaking would not be possible. In reality, however, the service was supposed to be reasonably continuous, subject to proper notice of necessary suspensions; and the Judge decided for the plaintiffs accordingly. Leave to appeal was granted, and therefore the case may again be heard of, as it is obviously of cardinal importance to distributors of electric power and their customers. The matter should not be lost sight of.

CHANGING LONDON AND ITS EFFECT ON GAS AND ELECTRICITY SUPPLY.

The discussion that is occupying so much space in the newspapers at the present moment, in reference to the proposal of the Governors of St. Bartholomew's Hospital to build an extension of their existing premises upon a part of the site vacated by the famous "Bluecoat" School, serves to call attention to what must have struck every fairly observant man who has travelled much about the Metropolis the past year or so. We mean the great changes that the growth of London, and the consequent enhancement of land values, are bringing about in those parts of the great city that lie nearest to the centres of commerce and fashion. The alteration in the "City" itself—from the old system of the merchant living over his shop or warehouse to the present non-residential system, whereby the "City" is a desert by night and a swarming hive by day—is, of course, quite ancient history. What we refer to is the change that is taking, or has recently taken, place in such districts as Marylebone, the City of Westminster—which extends from the Law Courts on the east to Albert Gate on the west—some parts of Kensington, Hampstead, Fulham, and Chelsea. Let anyone who knew London well fifteen or twenty years ago—it is hardly necessary to put the date so far back—and has not paid much heed to the changes that have since occurred, take a walk through the neighbourhoods we have named, using his eyes, and jogging his memory. It would be an interesting day's ramble.

It will not require an exceptionally quick eye to discover the great transformation that is being wrought by the "Holborn to Strand" scheme of the London County Council. The change is, of course, at present only in its preliminary stages; but the imagination requires little stimulus to enable it to appreciate the difference there will be between the new thoroughfare and its surroundings, and the mean streets and ugly slums that have been cleared away. A less obvious, perhaps, but no less sweeping, change has been in progress for several years now in another part of Westminster City—that lying to the South of the Abbey and Victoria Street. We had occasion recently to visit that neighbourhood, and were much struck with the wholesale clearance of slums which has been made. Westminster was once a festering mass of terrible slums, through which it was hazardous to venture, single-handed, by night. Now those slums are all but gone, and in their place stand huge blocks of high-class residential flats, or fine buildings, such as the Church House and the Roman Catholic Cathedral. Near the House of Lords, the change is only now taking place; but moving further South, there is to be found another great alteration. The site of the gloomy, forbidding prison of Millbank is now covered with hosts of good artizans' dwellings except where the Tate Gallery stands facing the river. In a few years' time, the face of Westminster proper will be completely changed; and Horseferry Road may yet be a fashionable thoroughfare!

To change the venue, let the enquirer visit Marylebone; and there he will find the same alteration in progress—poor-class and slum property being cleared away, and large blocks of fashionable flats erected on the sites. So, also, in those parts of Kensington that were not planted with fine houses many years ago; the mean streets are being, or have been, demolished, and hundreds, indeed thousands, of flats are being built in their stead. In other parts of the parish, fine old residences, standing in large grounds, are giving place to the ubiquitous blocks of flats; and the same changes may be seen in such old-world neighbourhoods as Chelsea and Chiswick, and, more or less, in the old parts of Fulham, of Clapham, and of Denmark Hill. What was once lawn or well-wooded garden is now a wilderness of bricks and mortar. Hampstead (the home of artists and literary men) feels the encroachment of the builder, and hears the felling axe. Everywhere, in fact, change is taking place; and the tendency is the same in all directions—namely, to increase the population per acre, to increase the assessable value in the parishes affected, to compel factories to seek cheaper homes in the country, and to drive the poorer classes further towards the fringe of the great city, rendering the allied problems of housing and travelling more and more acute. In short, London is becoming less and less what it was not long ago—a collection of towns, joined together and clustering round a central "City," but each containing its rich, middling, and poor quarters, its residential, trading, and slum areas—and is slowly welding itself into one huge city.

This is a matter of something more than mere curious interest to the Gas Company whose district comprises most of the areas in question, and to the several electrical undertakings—private and municipal—with which it has to compete for the custom of the inhabitants. All these rebuildings and changes afford the most obvious opportunities to our friend the enemy; and he is not slow to make the most of them. The electricity suppliers have many things in their favour—the modern craze for electric light; the prejudice of many architects and builders towards it, and their slowness to recognize the utility of gas for heating and cooking purposes; the ignorance of the public as to the relative merits and cost of gas and electricity; and (by no means least) the appreciation by the electric folks of the fact that customers must be sought, not waited for. So that the Gaslight and Coke Company principally, and the other Metropolitan and Suburban Companies in a less degree, will have to display no little activity and unsparing enterprise if all these changes—which must continue, for London is bound to rebuild itself practically in the course of comparatively few years—are not to see them left very much out in the cold. Times change, and so must business methods.

The Work of the Standards Department.—The Board of Trade have issued a report on the work of the Standards Department, which is under the supervision of Mr. H. J. Chaney, since their previous report, made on the 9th of August, 1901. The present report is dated August 1, 1902. Among the standards of measure and weight verified by the Department, of which lists are given, were gas-measuring standards for the Broughty Ferry, Ceará, Cleethorpes, Grays, Harpenden, Hawkhurst, Huntingdon, Normanton, Stroud, Sunbury, and Woking Gas Companies; and for the London and Middlesex County Councils, and the Local Authorities at Acton, Aldershot, Birmingham, Gloucester, Leeds, Manchester, Portsmouth, and Wokingham.

The Somzee-Greyson Incandescent Burner Patents.—It is an undeniable fact that the Intensified Gas-Light Company, Limited, were to the fore in this country in showing what could be done with the system of intensified gas lighting; but why the concern was not commercially successful, it is not our business to inquire. Their examples of work were good; and it was our pleasure to bring them under notice in these columns. But the Somzée-Greyson burners (the patent rights in which the Company held) are of a type which it would be a pity to allow to sink into oblivion; and so a Syndicate has been formed—whose operations will be conducted from the offices at 36, Victoria Street, S.W.—to work them. Before purchasing, they satisfied themselves that, by introducing certain improvements in the burners, the patents would be most valuable. By the aid of an Engineer experienced in incandescent gas work, the Syndicate have been directing their attention to effecting these improvements; and, as a result, they believe the burners which are now being manufactured, for both high and low pressure lighting, will meet with very large approbation. The ordinary burners are being made to take "C" glasses and fittings; and, in this respect, the letter from Mr. Charles Carpenter in last week's "Journal" anticipates one of the announcements which the Syndicate were about to make. With the high-pressure burners, they are introducing mantle protectors, and a special form of anti-vibrator. The burners (which are now being made in Birmingham) are solidly and carefully constructed; and they have a uniform fine finish. The Syndicate have also been experimenting with samples of the best known mantles—both English and Foreign—for high and low pressure purposes; and those chosen for recommendation with the burners they believe cannot be surpassed. The Syndicate are evidently going to make a strong effort to secure popularity for their goods; and in the large field open now to the development of the incandescent business, there is no reason why, under the new management, their enterprise should not meet with a good reward.

PERSONAL.

At the meeting of the Institution of Civil Engineers last Tuesday, it was announced that 23 associate members had been transferred to the class of members. Among the number was Mr. WILLIAM WINSTANLEY, Gas Manager and Secretary to the Newcastle-under-Lyme Corporation.

Sergeant BODLE, a Crimean veteran, now residing at Warrington, and his wife, recently celebrated their golden wedding by a festive gathering at the Assembly Hall in the town. The old warrior, who is a well-known figure in the borough, is a pensioner of the Royal Artillery, having joined the service in 1848 and fought all through the Crimean campaign. He got his discharge in 1870, and holds three medals and four clasps. Sergeant Bodle was the first man employed by Mr. Thomas Fletcher 32 years ago, and for nearly 20 years was the laboratory man in charge of all the original experimental work in connection with Mr. Fletcher's researches regarding gas. He has been superannuated for some years past, and is now in comfortable circumstances with a grown-up family, all doing well. Sergeant Bodle was the only one not directly employed by the present Company who shared in the distribution a year ago by Mr. Fletcher of £1000 among the employees of the present firm, in proportion to their length of service, when nearly 1000 participated.

OBITUARY.

The death occurred last Tuesday, at his residence in London, of Professor GUSTAV BISCHOF, whose name is well known to many of our readers in connection with his spongy-iron water-filter. He was born at Bonn in 1834, and became Professor of Chemistry at the University in the town. After passing through the Berlin University with honours, he assisted his father—the eminent geologist—in his researches. In 1871 he accepted the Chair of Technical Chemistry at Anderson's College, Glasgow. Four years later he came to London, and commenced practice as an analytical chemist, principally in connection with water analysis. His later years were devoted entirely to the perfection of a new process invented by him for the manufacture of white lead. The deceased Professor was in his 69th year.

By a rather curious coincidence, chemistry lost another devotee on Tuesday in the person of Dr. HENRY EDWARD SCHUNCK, F.R.S., one of the most accomplished successors of Dalton, Joule, and other chemists in the presidency of the Manchester Literary and Philosophical Society. Deceased was born in 1820, and was the son of one of the foremost Manchester merchants of his day, Mr. Martin Schunck. He studied chemistry in Germany under Liebig, with a view to managing his father's calico-printing works near Rochdale; but, after passing some time at the works, he withdrew from them in order to devote his life to scientific researches. Among his many scientific papers was one read in 1879 to the Royal Society, on "The Purple of the Ancients." He made discoveries of great practical importance in manufacture, some of them relating to the formation of indigo blue. He is said to have been the first chemist to obtain pure alizarin from the madder root. He had been a Fellow of the Royal Society since 1850. He took much interest in the affairs of the Manchester Literary and Philosophical Society, of which he was successively Secretary, Vice-President, and President; and in 1898 the Society awarded him the Dalton bronze medal for his researches, particularly those relating to colouring matter. In 1887 he was President of the Chemical Section of the British Association, on the occasion of the meeting of that body in Manchester; and he held the office of President of the Society of Chemical Industry in 1897. The latter Society awarded him their gold medal in 1900; and in 1899 he received from the Royal Society the Davy Gold Medal. The funeral took place on Saturday at Kersal Cemetery, Manchester. Deceased has bequeathed his valuable laboratory, together with an endowment of £40,000, to Owens College, Manchester.

The Beaumont Oilfield is contained in a district within the area of the coast prairie of the Texas, Louisiana, and Mexican region. The oil was discovered in 1901 by a drill-hole through 1100 feet of clay and quicksand. A year later there were 136 wells, now there are 214, and more are being drilled. During the first year, 5½ million gallons of oil were obtained; and five or six times this is estimated as the product for the present. The prairie land extends for nearly 400 miles along the Gulf of Mexico and from 10 to 50 miles inland.

Danish Portland Cement.—In the course of the description of the Granton Gas-Works which appeared in the "JOURNAL" last week, p. 96, some particulars were given as to the cement used in connection with the works. We learn that the Danish portland cement there referred to was produced at the Cement Company's Danmark Works, near Aalborg, which were designed and started by Mr. F. D. Marshall, of Copenhagen. The system employed for producing this cement is quite unique, both as regards the methods of mixing and burning. The Company's "Danmark" cement is said to be of the highest quality in the market; and there has been, and is, a great demand for it, both for local purposes and for export. The Granton works used a very considerable quantity.

COMMUNICATED ARTICLE.

SOME EXPERIENCES WITH WATER GAS.

By HAROLD E. COPP, of West Bromwich.

I was much interested in the article on "Experiences with Blue Water Gas at Ilford" which appeared in your issue of the 30th ult. Having been responsible for the manufacture of a large quantity of both blue and carburetted water gas, I venture to hope that a few points in which my experience with the former does not altogether coincide with that at Ilford may interest some of the readers of your article.

Rather more than a year ago, I found that the introduction of cold water gas into the foul-gas main had a prejudicial effect on the yield of gas; and, moreover, great difficulty was experienced in keeping the illuminating power constant. It is obvious that this method violated what are now almost universally observed rules for the condensation of coal gas; besides, I do not think it can be expected that cold water gas, although containing a larger proportion of carbon monoxide, would pick up and carry forward hydrocarbons which have been thrown down by the hot coal gas. This led me to make a lengthy series of experiments with a view to ascertaining the effect on the illuminating power caused by adding varying proportions of blue water gas. But here another difficulty was encountered. The 16-candle standard argand was designed to give the maximum illuminating effect to coal gas of 16-candle power; and thus, when water gas was introduced, the supply of air to the burner was in excess of that necessary to produce the best result. I therefore obtained a burner as similar as possible to the standard, the air supply to which was capable of adjustment. The mixtures of coal gas and water gas were accurately measured in two small experimental test holders; due time being allowed for diffusion and intimate mixture. The following table gives approximately the average of a large number of tests:—

Illuminating Power.

Percentage of Water Gas.	Air Supply Normal.	Air Supply Adjusted.	Decrease Per Cent.
Nil (Unenriched Coal Gas).	12·30	12·50	..
10 Per Cent.	11·00	12·00	4
15 ,,	8·00	11·00	12
20 ,,	7·00	10·25	18
30 ,,	3·00	9·00	28

The only way in which I am able to account for the difference between the first column and the last, and also the phenomenon experienced at Ilford, that with 10 per cent. of blue water gas there was an increase of half-a-candle, is that the blue water gas contains a much larger proportion of hydrogen; and its flame temperature being consequently higher, it raises the liberated carbon to a greater degree of incandescence. When used in the incandescent burner, a much better illuminating effect is obtained when the gas contains a proportion of the blue water gas, as less air is required for its combustion, and, moreover, as in the ordinary burner the larger proportion of hydrogen has an important and beneficial effect. I hope, however, to carry my investigations further in this direction.

I next tried the effect of passing the blue water gas into the retorts by various methods, but in no case was I able to get the results that seem to have been obtained at Ilford. Moreover, it was in every instance accompanied by stopped pipes and foul gas-mains, in which a solid deposit of carbon was found. This method was continued for several weeks; the results being little better than those given in the table. The next step was to pass the coal gas through an empty retort, and thence into the foul-gas main; but it was found that the retort got much too hot, and we had the same difficulty with stopped pipes. The illuminating power was, it is true, better with the cold mixtures; but I cannot say that the results were surprisingly good. I may here state that "dry" mains are in use at West Bromwich; and this may, to some extent, account for the difficulties with stopped pipes. We are now introducing the blue water gas at the condensers at a temperature of about 180° Fahr., and have derived more benefit from this method than from any of the foregoing. I think the fact that the blue water gas, when introduced in the several above-mentioned ways, dried up the tar, shows the great affinity which the gas has for the light hydrocarbons, and that if it could be led into the retorts by suitable means, good results might be expected; but I certainly do not believe in stopping one ascension-pipe of a "through" retort, and using one only.

In connection with the results obtained at Ilford, it would be interesting to know the illuminating power of the out-going gas before and after the experiment during which 40 per cent. of water gas was used; also whether the 75,806 cubic feet of gas per ton was corrected for carbonic acid, and also to normal temperature and whether moisture and ash were in the coke from which it was produced. We have been able to obtain over 73,000 cubic feet of gas, corrected for temperature and carbonic acid, from

specially selected coke; but I do not think this can be expected in ordinary work, especially with intermittent working.

Now, with regard to the calorific power. I have a daily test made (with a Junkers calorimeter) of the water gas and the mixed gases, and find the former varies very little from 280 B.T.U.; the coal gas averaging about 640 B.T.U. Assuming that the proportion of benzol required for the water gas was as much as 0·60 gallon per 1000 cubic feet, the calorific value supplied by this amount would only be about 100 B.T.U.—making about 380 B.T.U. for benzolized water gas. It is thus somewhat difficult to understand so small a drop as 5 per cent. in calorific power with such large proportions of water gas as were used at Ilford. It has been necessary for me to exercise much caution in the conduct of my experiments, as the illuminating power is kept within half-a-candle, and the calorific power is maintained above 600 B.T.U. gross. It is a significant fact, however, that we have been able to do this with as much as 20 per cent. of blue water gas added.

I should like to say, in conclusion, that, although there is a considerable difference between my experience and that recounted by your correspondent, I have a very high opinion of the Dellwik-Fleischer water-gas process, and am more than satisfied with the results I have been able to obtain from it, which have so nearly approached those theoretically obtainable from the coke. In common with other types, however, it cannot be worked to great advantage when regarded as a mere gas-making machine.

The Heard Fund.—Doubtless owing to the pressure of business just at the turn of the year, many of our readers overlooked the paragraph which appeared in our issue of the 6th inst. (p. 15), in which it was suggested that a further small fund should be raised for the assistance of the aged and very poor widow of the late Mr. Edward Heard. We purpose publishing next week a first list of contributions; but as the response so far has been of the most meagre description, we take this opportunity of bringing the matter to the attention of those who did not see the previous paragraph, and of reminding those who did read what was then said but have not yet acted upon the suggestion. The case is a most deserving one; and no pleading on our part should be necessary to secure ample support for it.

The Metropolis Water Act, 1902, Epitomized.—We have received from Mr. T. Hennell a pamphlet by him, which has just been published by Messrs. E. & F. N. Spon, Limited, giving an epitome of the above-named Act, with a few observations upon the measure. The principal matter for the consumers is contained in the last paragraph, in which the author points out that the Water Board will not be able to lower the charges to any considerable extent until they have fully ascertained their financial position—not only in regard to the interest payable on the loans raised for the purchase of the Companies undertakings, but to the cost of works required for the future supply of London. The text is accompanied by a map showing the limits of supply and representation upon the Board.

Adoption of the Lacarriere Burner at Dijon.—It may be remembered that at the last meeting of the Société Technique du Gaz en France, M. Badon-Pascal described the above-mentioned burner, which is constructed in accordance with the specification of MM. Houdville and Triquet. In the "JOURNAL" for the 29th of July, we gave the results of some tests of the burner carried out in the municipal laboratories in Paris and Lyons; and they showed a very good duty. We find from the last number of "Le Gaz" that the makers of the burner were commissioned to improve the public lighting of Dijon by fitting the 2200 lamps with this appliance. The work was commenced in the summer and finished towards the end of October. The consumption of gas per burner is 3·18 cubic feet per hour, and the illuminating power is from 76 to 86 candles. The burners are lighted by the alcohol-jet torch patented by the Paris Gas Company, but slightly modified.

Statistics of Dutch Gas-Works for 1899 and 1900.—We have received a copy of a "Statistical Review of the Working Results of the Municipal Gas-Works and Some Private Gas-Works in Holland in 1899 and 1900," compiled by D. van der Horst, of Amsterdam, and P. Bolsius, of Bois-le-Duc. The work, which is printed for private circulation only, and is in the Dutch language, is a very careful compilation, giving the fullest possible statistics as to the working results of 87 gas-works during the two years named. There are over 100 columns in which the particulars are stated, wherever available, for each works. It will thus be seen that the scheme followed is a very complete one. We may mention some of the main headings, all of which comprise several subsidiary ones, under which data for each works are given: Town, manager, date when works opened, population, coal, &c., used, make of gas, carbonizing plant, gas consumption for different purposes, coke, tar, liquor, public lights, meters, tariff, pressure, mains, purification, illuminating power, water gas, and fire insurance. In some respects, this review of Dutch gas-works resembles our Board of Trade returns of gas undertakings; but it is, generally speaking, more detailed. We miss, however, the summary which appears at the end of the English returns. Heeren van der Horst and Bolsius have, however, carried out their arduous task in a thorough and capable manner; and the work must be very valuable to all interested in gas supply in Holland.

TECHNICAL RECORD.

THE GAS INDUSTRY AND THE MANUFACTURE OF CYANIDE.

Continuing our abstract translation of the articles on the above subject contributed by MM. Robine and Lenglen to the "Revue Générale de Chimie Pure et Appliquée" (*ante*, pp. 35, 101), we come to their remarks on the various processes for the extraction of cyanogen compounds from ammoniacal liquor.

The authors begin by pointing out that ammoniacal liquor contains a certain percentage of cyanogen in the form of ferrocyanide and sulphocyanide of ammonium. The proportion of the former varies from 150 to 180 grammes (2250 to 2700 grains), calculated as prussian blue, per metric ton of coal; but the quantity of the latter is very variable, and depends upon the age of the liquor. The admitted average quantity which a metric ton of spent gas liquor—that is to say, liquor from which the ammonia has been distilled—can give is 6 kilos. (13·2 lbs.) of sulphocyanide. Originally, cyanogen compounds were recovered in the following way: After the liquor had been treated for the extraction of the ammonia, it was allowed to rest for a time, and then run off, and equal quantities of the sulphates of copper and iron added to the clear liquid. Thus sulphocyanide of copper was formed and decomposed with sulphide of ammonium, to obtain sulphocyanide of ammonium. This was the Spence process. Subsequently the sulphide of ammonium was replaced by sulphide of barium. M. Pendrié, about 1888, extracted the cyanogen compounds from ammoniacal liquor in the form of prussian blue. The residue from the distillation of ammonia was decanted after rest, and ordinary sulphuric acid was added until acid reaction took place, with the object of removing the sulphuretted hydrogen. It was allowed to remain for 24 hours, in which time sulphur and lime were deposited. After decantation, the clear liquid was mixed with a certain amount of ferric salt; and prussian blue was precipitated. It could be transformed into ferrocyanide of potassium after separating it by decantation, and leaving it for several days in contact with a caustic potash or carbonate of potash lye. Mr. Bower, seven years later, precipitated the ferrocyanide and sulphocyanide by a copper salt which formed insoluble compounds. The mixture of the two salts was then treated with iron, which produced insoluble ferrocyanide of iron and soluble sulphocyanide of iron. In principle, the process is carried out as follows: The ammoniacal liquor is treated with magnetic iron before distillation, either singly or mixed with an iron salt in sufficient quantity to bring all the cyanogen to the state of ferrocyanide and sulphocyanide of iron. The liquor is then distilled in the presence of an excess of quicklime in a boiler with an agitator. The residual water, containing ferrocyanide and sulphocyanide of calcium, is treated with a solution of cupreous chloride in sufficient quantity to precipitate all the cyanogen compounds in the state of insoluble salts. The precipitate is collected, washed, and, while moist, again treated with fine iron dust. The iron takes the place of the copper, and gives insoluble ferrocyanide and soluble sulphocyanide, which are separated by filtration. The ferrocyanide of iron is then treated boiling with an alkali, to obtain a soluble alkaline ferrocyanide which is purified by crystallization.

Somewhat different is the process of Messrs. Lewis and Cripps (1896), the *technique* of which is as follows: After distilling the ammonia by the ordinary method, the residual liquid containing ferrocyanide and sulphocyanide of calcium, and running from stills, falls into a suction tank, whence it is pumped to the top of a tower filled with broken coke or bricks. It filters through this material, meeting as it does so an opposing current of sulphurous acid and carbonic acid. This gaseous mixture is obtained by conveying the waste gas from the ammonia distillation through a fire, which burns the sulphuretted hydrogen, and transforms it into sulphurous acid. Under the action of this gaseous current, the liquor, primarily alkaline, is neutralized, and becomes acid. The acid solution flows from this tower into a large tank divided into two unequal compartments. It enters the larger one, where it is treated with liquor containing ferrous and ferric salts, which precipitate the ferrocyanide in the form of prussian blue. The liquid flows alternately from one compartment to the other, giving the precipitate time to deposit. The supernatant liquid then enters a special tank for the regeneration of the sulphocyanides. For this purpose a sulphate of copper solution is added and insoluble white cupreous sulphocyanide is deposited. Preliminary treatment with sulphurous acid is essential; otherwise partially soluble black sulphocyanide of copper would be formed. The cupreous sulphocyanide precipitate is separated by decantation and washed. It is treated with a solution of alkaline hydrosulphate, the result being the production of alkaline sulphocyanide and insoluble copper sulphide. The alkaline hydrosulphate is also obtained by utilizing the waste gas coming from the distillation of ammonia. Exposure of the sulphide of copper to the air, and subsequent treatment with an acid, regenerates the copper salt employed for precipitation.

The next subject taken up is the extraction of cyanogen compounds from gas purifying material. The authors remark that

in gas-works where the cyanogen compounds are not extracted direct, as is usually the case, the purifying material is an important source of these products—containing as it does the main portion of the cyanogen formed during the process of gas manufacture, as well as the sulphuretted hydrogen. The composition of the purifying materials varies with the works and the countries in which they are situated. Generally speaking, mixtures of lime, ferrous sulphate, or iron oxide are employed. In Germany and Belgium, extensive use is made of artificial iron oxides exclusively, especially the brown oxide called limonite. These materials, as is well known, are transformed in the purifying vessels into iron sulphide, sulphur, ferrous ferrocyanide, sulphocyanide of iron, &c. When they become inactive, they are revivified by being spread out on level surfaces, and turned over with a spade. The process of revivification can be gone through several times on the same mixture; but finally the main part of the iron oxide is transformed into prussian blue (apparent by the greenish-blue colour of the material), and the sulphur accumulates to such an extent —from 30 to 40 per cent.—that the mixture becomes spent, and is sold or treated on the spot to extract the cyanogen compounds and the sulphur. Its composition varies, of course, with the kind of coal employed, the system of carbonization, the composition of the purifying material, and the method of its revivification. The following table gives the percentage composition of some spent purifying materials:—

	Sulphur.	Prussian Blue.	Sulphocyanide of Ammonium.	Ammonia.
Laming mixture (after eight revivifications)	33·50 ..	11·20 ..	14·08 ..	—
Lux mixture	40·75 ..	3·08 ..	5·14 ..	2·23
Natural oxide of iron	30·51 ..	6·30 ..	4·08 ..	0·41
	30·63 ..	8·62 ..	2·12 ..	1·30

Formerly, spent purifying material was regarded as rubbish; but manufacturers discovered how to turn it to profit, and now it is treated for sulphur, sulphate of ammonia, and cyanogen compounds. M. Gauthier-Bouchard conceived the idea of utilizing it for the manufacture of prussiate of potash. His system (employed at the Aubervilliers works) is as follows: The material is first subjected to lixiviation with cold water to remove the soluble salts (the ammonia and sulphocyanide of iron). The insoluble residue is well mixed with hydrated lime, in the proportion of 30 kilos. of lime per 1600 kilos. of washed material, water added, and all well stirred. After some hours' rest, the material is again lixiviated with cold water, and the residue left for some months in the air. The wash water thus contains ferrocyanides in the state of lime salt. The first water, more condensed, is treated with carbonate of potash, which determines the formation of insoluble carbonate of lime and the ferrocyanide of potassium left in solution. The latter is decanted, evaporated, and crystallized. The last water, being too weak for profitable treatment, is mixed with protosulphate of iron, which likewise precipitates white ferrous ferrocyanide transformed into prussian blue on contact with the air. In this way, M. Gauthier-Bouchard succeeded in extracting from 1500 cubic metres (41,250 bushels) of spent purifying material obtained from the Paris Gas Company 22,500 kilos., or 22·5 metric tons, of prussian blue. The ferrocyanide of potassium thus produced was worth 275 frs. per 100 kilos. Most inventors of the period, however, though admitting the real merit of this process, preferred, for the manufacture of yellow prussiate, that of the calcination of nitrogenous organic matter, notwithstanding its defects.

A modified arrangement of the Gauthier-Bouchard process is still employed at the Arnould works at St. Ouen-l'Aumône, near Pontoise, where it was introduced in 1875. The works were established in 1869; and, owing to the scientific knowledge of their founder, M. Arnould, it has been possible to adopt there a really commercial system for the manufacture of prussiates. By an arrangement effected with the Paris Gas Company, M. Arnould's firm are the only purchasers of the spent purifying material from them, and, moreover, are the sole manufacturers of prussiates, by this process, in France. The following figures give an idea of the growth of this industry: In 1880 the production of prussiates was 142 metric tons; in 1889, 233 metric tons; and in 1899, 943 metric tons.

Most of the subsequent inventions are only modifications of the Gauthier-Bouchard process; the improvements introduced relating chiefly to lixiviation and transformation into ferrocyanide of potassium. The processes now in vogue are very much alike, though they may be classed in two categories. In the first, the spent material is treated with sulphide of carbon to extract the sulphur; while in the second the recovery of the cyanogen compounds is effected at once. These processes will be dealt with in the next (and concluding) article.

At the Royal Institution last Friday, Professor Dewar delivered an interesting lecture on "Low Temperature Investigation." In the course thereof, he performed the experiment of plunging a Nernst electric lamp in liquid air, when it went on burning as in atmospheric air. He remarked that there had been some discussion as to the cause of the light in this lamp, which was stated not to burn in a vacuum, and it had been ascribed to a combination of electrolysis and oxidation. But it burnt in liquid oxygen, with the production of ozone, and also in liquid nitrogen —a fact which seemed to require a reconsideration of the theories propounded by certain distinguished electricians.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Honorary Membership of the Institution of Gas Engineers.

SIR,—You have a fair *tu quoque*. Reference to my copy shows that I owe an apology to your readers and yourself for the use of a meaningless word. I can but ask a charitable allowance for the infirmities of "declining years," and for the pitfalls of shorthand dictated at high speed, with a pronunciation impaired—alas!—by damages to teeth from sundry "falls," and most of all for a too hurried scanning of the type in hastening to a train. My speed is always a trouble to shorthand writers—indulgent long-sufferers!

One thing I would add. Mr. Helps tells me that, under rules previously existing in both the dissolved societies, future nominations for the honorary class will have to secure a two-thirds majority of the members.

Stepney, Jan. 17, 1903. H. E. JONES.

[Mr. Jones is generous to us, as well as in his self-abasement. But we must protest against his reference to the "infirmities of 'declining years.'" There are signs of plenty of life and good work in our esteemed correspondent yet. As to the last paragraph of his letter, the matter is referred to in an editorial article on the question of "The Honorary Membership of the Institution."—ED. J.G.L.]

Inclined v. Horizontal Retorts.

SIR,—I must confess that I am rather astonished at the way in which Mr. West has dealt, in the last number of the "JOURNAL," with the different figures. But this does not convert Bury's 1s. 1½d. into Heckmondwike's 9¾d.

To begin with, I cannot allow Mr. West to deduct the cost of getting coal from his stores into the retort-house, because, not having overhead hoppers to hold 36 hours' storage with horizontals and machinery, coal cannot be so cheaply handled with them as with slopers, where the question of getting the coal into overhead hoppers in the cheapest manner receives first consideration. Neither can I allow Mr. West to convert Bury's working from eight-hour into twelve-hour shifts, so as to enable him to compare machinery favourably with our slopers Our bottom men leave the works after being on duty nine hours; and surely this cannot be construed into a twelve-hour shift.

Mr. West is also taking advantage of a very important fact, that whereas the Heckmondwike figures are for a period of over five months, his figure appears to be for a short period with best working with a maximum production, and that when on the minimum make the Bury cost will jump up to at least 1s. 8d. per ton. I think Mr. West will find that Bury themselves do not claim to do better than an average of 1s. 3½d. per ton of coal, which puts a very different complexion on the matter. As Mr. West has not corrected for difference in rate of wages between Bury and Heckmondwike, I presume the Bury wages are lower than we are paying at Heckmondwike. The wages I named in my reply to Mr. West (*ante*, p. 42) are our minimum wages; our men taking the full year round receiving more money. If correction were made for this, and if Mr. West would also kindly convert the Bury figures, where they have an annual make of 370 millions per annum, so as to show what they are likely to be if they are only making 105 millions as at Heckmondwike, I venture to say that horizontals with machinery will compare still worse with slopers, where the works are of smaller capacity than at Bury.

We are now getting a much better yield per ton of coal than we did when our settings were first started, and have at times made as much as 11,500 cubic feet of gas per ton. But when discussing makes per ton, the peculiar circumstances of each concern must be carefully taken into account. For instance, here we have a gasholder capacity of a little over 50 per cent. of our maximum output; and as our principal object is to supply a manufacturing district with gas, and to work safely under such critical conditions, where the slightest slip would often spell disaster, a large average yield becomes a physical impossibility. In connection with this phase of the question, other matters must be also considered, such as quality and price of coal used, candle power of gas supplied, whether cannel enrichment obtains, or water gas is employed, &c.

Heckmondwike, Jan. 17, 1903. A. F. GOODSON.

SIR,—With regard to the further correspondence which has lately appeared in your pages as to the inclined and horizontal systems of carbonizing, Mr. Goodson is certainly to be congratulated on the exceedingly low cost of 9·75d. per ton at which he is able to carbonize by the former system. To Mr. West, however, the credit must be given of showing, in the first instance, how to carbonize coal cheaply. But much as Mr. West's machinery was in advance of the old system of carbonizing by hand, so I think the inclined system is in advance of carbonizing by machinery. To anyone who has had experience of both, it must have been apparent that the labour and exertion needed for working a well-arranged system of inclined retorts is not nearly so exhausting as that required to work stoking machinery; and I have no hesitation in saying, after a fair experience with both systems, that a twelve-hour shift with inclines can be done with much less fatigue than an eight-hour shift on a stoking-machine. (I do not advocate twelve-hour shifts, as I think eight hours quite long enough for anyone working retorts.) Moreover, at the end of the season's work with machinery, the usual amount of overhauling and repairing must be carried out before another season's work is commenced; and a good deal of such labour requires to be done by trained mechanics, whereas with the inclines no such consideration arises.

Much has also been said as to the cost of maintenance of the inclined

settings being heavier than that for horizontals. No doubt, so far, this is partially correct; but as with the lengthened life of the present generator and regenerator horizontal settings over those of the old direct-fired type, so I have no doubt it will be, in time, with the inclined settings over the most up-to-date horizontal settings. Upon consideration, the reason for this is not far to seek; for, given a substantial and well-braced setting of inclines, the wear and tear on the retorts through the coke gliding out is practically *nil*, whereas on horizontal retorts, drawn either by hand or machinery, the wear and tear is severe.

Again, in comparison with stoking machinery, the inclined system is only in its infancy, as it were; and if its manhood fulfils the promise of its early youth, we shall yet see the inclined system worked, as so often depicted in your pages, by the sprightly damsel manipulating the levers, not on the charging floor, but comfortably installed in an office at the end of the retort-house, from which point all she will be required to do to work this simple system of carbonizing coals by inclined retorts will be the pressing of an electric button.

ALEXANDER ALLAN.

Scarborough, Jan. 17, 1903.

Notable Experiences with Blue Water Gas at Ilford.

SIR,—I regret to find it necessary to refer again to my letter on this subject in your issue of the 6th inst., owing to the communication that appeared in last week's "JOURNAL" on the same matter in reply to mine. In my letter of the 6th inst., I stated: "For some years past, with the 'Economical' type of generator, we have been obtaining the same or a greater amount of gas per ton of coke used," &c. As in the generator we make only "blue" water gas, and not carburetted water gas, I hardly thought it necessary to specify "blue" water gas. But I now state that I referred to "blue" water gas only, and that the figures given in Mr. Dellwik's letter appearing in your last issue are incorrect so far as those results apply to the "Economical" type of plant.

With reference to the cost of the gas, I am still of the opinion expressed in my letter of the 6th inst.; and it appears that Mr. Dellwik, in his reply, has entirely deviated from the premise therein expressed.

J. T. WESTCOTT.

19, *Abingdon Street, S.W., Jan.* 14, 1903.

Clips for Meter Connections.

SIR,—I see on p. 37 of your issue of the 6th inst. an article "A Clip for Gas-Meter Connections." Kindly allow me to say that for twelve or fifteen years I have had a similar clip in use for locking meters when the supply of gas has had to be discontinued. This is done by inserting a cork in the inlet-pipe and securing the union by the clip, which is either locked or sealed with a lead seal. No patent rights attach to this clip.

HENRY GREEN.

Preston, Jan. 13, 1903.

Dr. Kramers' Water-Gas Apparatus.

SIR,—We had supposed that the "JOURNAL" translations of Dr. Kramers' articles on water gas could have but academic interest to the gas profession in this country; and we held the same view regarding the report on the Kramers apparatus by the Special Committee of the Dutch Gas Association. Now, however, that our attention has been called to several English pamphlets distributed by the Kramers Syndicate, and our criticism thereon is invited, we think the following letter may be of supplementary interest.

We have followed the discussion relating to Dr. Kramers' apparatus with our usual interest in proposals affecting the gas industry. Aside from this view, we cannot see that we are concerned with the outcome of his efforts, as a direct comparison with our process is not possible, owing to the different purposes in view. Other writers, however, have attempted such comparison; and, in so doing, they have made errors which demand our attention.

For example, Dr. Smits (see "Het Gas," January, 1902) reduces the volume of gas per kilo. of carbon which he credits to our process, by the volume of oil gas produced at the expense of a portion of this carbon. He thus credits us with only a part of the work done by the kilo. of carbon. He also omits to compare the heating value of the Kramers gas—say, 2700 calories—with the far higher calorific power of carburetted water gas.

Dr. Steger ("Het Gas," March, 1902) does not overlook the question of heating power; but, to justify his comparison of two such dissimilar commodities, he cites the heating power (5067 calories) of the Königsberg town gas as being about equal to that of carburetted water gas. But Königsberg gas is not Kramers gas. It is a mixture of about 80 per cent. of coal gas and 20 per cent. of water gas; the loss in heating power and candle power due to this small admixture of water gas being partially made up with benzol.

Dr. Steger also repeats the heresy that the flame temperature of "blue" water gas develops an incandescent effect much greater than in proportion to its calorific power; and, when reporting on the Kramers apparatus for the Committee of the Dutch Gas Association, he goes so far as to say:—

> Without stating the exact proportions, we are strongly convinced that much less water gas is wanted than coal gas to attain with Auer mantles the same luminant value.

Now there is no practical difference between the flame temperatures of "blue" water gas, common coal gas, or richly carburetted water gas; and the volumes of these gases required for a given degree of light by incandescence should be theoretically in inverse proportion to their heating powers. In practice, however, some comparative deficiency in "blue" gas may result from its small combustion area, which limits the effective height of the mantle; and the rapid deterioration of the mantle from deposit of oxide of iron must be especially considered. It may be worth mentioning that the recent experiments of Messrs. White, Russell, and Traver, of the University of Michigan, indicate far less comparative effect by incandescence with "blue" gas than should be due to its calorific power (see "JOURNAL," April 8, 1902, p. 892).

Dr. Steger also deduces fictitious fuel results from our apparatus, by eliminating the volume of the oil gas produced. He charges the gross consumption of coke to the residue of "blue" gas, and deliberately neglects the fact that a large portion of this coke is applied to the manufacture of oil gas; although, in the cases cited by him, this eliminated volume of oil gas raises the "blue" gas from zero to 26 Hefner candle power in the case of Bremen, to 22 Hefner candle power at St. Gallen, and similarly at Rotterdam. Moreover, this oil gas increases the net heating power of the "blue" gas from 2500 to over 5000 calories.

With reference to St. Gallen, he not only quotes the residue of "blue" gas as if it were the total finished product (carburetted water gas), but fails to state that the fuel used was moist coke, for intermittent working averaging five hours daily over several months, and included all fuel for maintaining the fires from day to day, as well as that used for raising heats.

In short, Dr. Steger uses the statements regarding our process published in the advertisement of the Dellwik generator, although these misrepresentations have been conclusively and publicly disposed of by Herr Gerdes, Ober-Ingenieur, firma Julius Pintsch. (Schweickhart's "Zeitschrift für Gas- und Wasserfach," 1899. "Journal für Gasbeleuchtung," Dec. 14, 1901.)

We agree with Dr. Steger that the gas manufacturer "will certainly select that apparatus which gives the highest efficiency" (provided it produces the gas best suited to his purposes); but, in deciding this point, the intelligent manufacturer will consider the cost of the finished gas, ready for sale, and will not limit himself to a single item in the ultimate cost. In a word, the real consideration is the cost of light and heat delivered to the consumer, and relative merit must be gauged by this scale. Recuperative and heat-saving appliances without end have been not only patented, but exhaustively tried, in the United States; but, however successful in technical operation, they have been rejected commercially when the value of the fuel saved is less than the expense (increased interest, labour, repairs, &c.) of saving it. In short, thermal perfection may, if ungoverned, be commercially wasteful.

The data necessary for a useful discussion of Dr. Kramers' apparatus are not at present available; and, as illustrating the ground for this statement, we would offer a few observations on the trial of Kramers' apparatus as reported by the Committee of the Dutch Gas Association. Our criticisms apply equally to the later test conducted by Dr. Smits, of Amsterdam.

(1) The trial of the Committee lasted only a little over one hour.

(2) The report makes no mention of any attempt to examine and neutralize the condition of the fires at the start and finish. The fire in a generator—especially in one of small diameter—has a tendency to maintain its height, though a large proportion of the carbon contents has been used up in gas making. At the end of the period of working, the fire must be cleaned; the honeycombed fuel-bed consolidated; and the difference in level made up with fresh fuel, in order to determine the fuel consumption. Deducting the refuse thus removed, makes possible a determination of the combustible actually consumed for gas making (provided the trial be sufficiently extended), without recourse to laboratory analyses and deductions. The entire quantity of fuel divided between the two generators in this test could not have made a layer of more than 4 to 6 inches in depth; and the effect of ashes and clinker in holding up the level of the fires might easily have accounted for a similar difference.

(3) Since the ashes and clinker were left in the fires, the fresh coal added during the trial replaced only carbon. There should, therefore, have been no deduction made for ashes, &c., from the weight of coal fed in. This mistake alone increases the yield per unit of carbon by 16½ per cent., and is quite apart from the further need of consolidating the decarbonized fuel-bed.

To further illustrate the impossibility of accepting the results as published, let us turn again to the report by Dr. Smits. He ascribes to the apparatus a yield, per kilo. of carbon consumed in generators, of 3·28 cubic metres of gas, with the following heating values:—

Gross value	2871	calories	per cubic metre.
Net value	2626	,,	,, ,,

A simple connection of cause with effect shows that this means an efficiency of over 100 per cent. Inasmuch as (say) 80 per cent. is a satisfactory efficiency for a modern steam-boiler—which is practically an industrial calorimeter—grave errors of observation or deduction might have been suspected by Dr. Smits.

Mr. Sissingh, Under Director of Public Works of Rotterdam, has pointed out some of these errors; and we note that Dr. Kramers endeavours in his more recent writings to meet Mr. Sissingh's criticism by reverting to a yield of 2·74 cubic metres per kilo. of bituminous coal. By ascribing to this coal a heating value higher than that of carbon, and by certain assumptions regarding the quantity and temperature of the steam, &c., he succeeds in reducing his efficiency to 86·7 per cent. We make no attempt to analyze his elaborate discussion, having seen enough of similar efforts to know that it is idle to base such a superstructure of thermo-chemical mathematics upon a wholly insignificant and unconvincing laboratory experiment.

Finally, with reference to the originality of the Kramers patent, the United States files of now obsolete patents indicate the thoroughness with which this field has been already covered.

HUMPHREYS AND GLASGOW.

38, *Victoria Street, S.W., Jan.* 13, 1902.

P.S.—The foregoing is a somewhat free translation of a letter which appeared in "Het Gas" last May.

"A Ray of Light" and its Electrical Critics.

SIR,—The general circulation of the above-named pamphlet among gas consumers and others by the three large London Gas Companies has naturally not been received with the best grace by our friends of the electrical profession. At a recent meeting of the London Electrical Contractors' Association, Mr. W. R. Rawlings read a paper on "Electricity as a Competitor with Gas," in which the pamphlet came

in for considerable attention. Of criticism of it, however, it is difficult to find any. The paper opens with the complaint that by such literature many (*i.e.*, of the general public) are "induced to use gas who would otherwise adopt electricity"—a testimony to the value of the pamphlet upon which, coming from so high an authority, I, as the author, ought surely to be congratulated. This, of course, is the object of these "Light Rays;" and it is gratifying to be assured by our opponents that they are so well performing the desired functions.

My attempt to define, in popular phraseology, the Board of Trade unit of electricity comes in for some banter. But surely Mr. Rawlings's humour would carry more weight if it were supported by a *bonâ fide* attempt on his part to improve on my definition. Such efforts, however, do not apparently commend themselves to Mr. Rawlings. He evidently prefers, like Agag of old, to "tread delicately" in such matters, and neither unduly to commit himself, nor to explain matters electrical in terms too readily to be understood by the public.

We are next told that—"Ebenezer says that a 1000-candle power incandescent gas-light costs 2¾d., and the same light by electricity costs 15d. in the same given time, or nearly seven times as much." In this comparison, gas is given as at 3s. per 1000 cubic feet—electricity at 4d. per unit. Now, Mr. R. J. Angel, the Borough Surveyor of Bermondsey, in November last presented to his Council a statement specially prepared by him on the basis of the actual cost of the lighting of the streets; and he showed therein that the cost of incandescent electric lighting (alight only *half* the night, or, say, 2000 hours per annum) was 1s. 4¾d. per candle power per annum; while the cost of ordinary incandescent gas-lighting (alight *all* night, or, say, 4000 hours) was 10d. per candle power per annum. Placing both systems on the same footing, and calculating the price of current at the usual figure of 4d. per unit (as in "A Ray of Light"), Mr. Angel's figures show—

Cost per 1000 candles per hour, of ordinary incandescent gas (at 2s. 6d.)	2¾d.
Ditto of incandescent electric light (at 4d.)	16¾d.

Mr. Angel's figures of the actual cost to the borough of Bermondsey of the several types of lamps reported upon thus clearly show that the "Ray of Light" statements rather under-estimate than otherwise the case for gas in comparison with electricity.

Mr. Rawlings then goes on to say: "After the statement that electricity is seven times as costly as gas, Mr. Pye proceeds to give some practical illustrations, in which the only thing he manages to show is that electricity costs nearly three times as much as gas—the seven times theory coming hopelessly to grief" The opening paragraph of the chapter on "Practical Illustration" contains the following: "These examples illustrate the workings of gas and electricity respectively only when the conditions are such as to favour the use of electricity to the greatest extent at present possible." Similar explanation is given at the close of the chapter. Extreme statements of consumers as regards electrical charges in comparison with gas, based on the quarterly bills, are as plentiful in a gas office as blackberries in autumn (Mr. Rawlings must know this); and they were designedly avoided in the preparation of "A Ray of Light." But, if he so desires, he can have sufficient of them to fill the columns of the electrical papers without leaving even one small corner for those few *contra* experiences which afford comfort to him and his professional brethren, and which provide for us the solitary exceptions necessary to prove the rules long since known, and now recorded in "A Ray of Light."

Mr. Rawlings's remarks on the paragraphs devoted to dirty ceilings indicate a surprising lack of acquaintance either with the subject under review, or even with the pages which he presumes to criticize On page 14 it is clearly indicated how the concentrated deposits are to be entirely avoided. The design of burners has nothing to do with the matter. How superficially he has skimmed the subject-matter is further illustrated by the following: "In spite of his assertions as to the black deposit, Mr. Pye goes on to ask 'Is it better, with the help of the gas-flame, thus to have these solid impurities deposited on the ceilings out of harm's way [they are also to a great extent sterilized] and to occasionally clean them away for human consumption?'" Mr. Rawlings says this is "simply lovely;" but it illustrates how the general public is led astray. This paragraph, as Mr. Rawlings would have seen if he had read the chapter through, does not refer to black deposits due to the imperfect use of gas (which is absolutely avoidable), but to the atmospheric dust and other impurities ever present in the air, which, by the aid of the gas-flame, are carried upwards, but which remain in the air without such assistance (see p. 13). It is noticeable that the words within brackets—"they are also to a great extent sterilized"—do not appear in the report of the paper, Was the omission designed, or is the statement "beneath notice"?

The last point calling for attention is the reference to ventilation, and more especially to the employment of fans. Mr. Rawlings really must be more careful. I will give his own words: "In spite of the beautiful ventilation afforded by the gas-flame, however, Mr. Pye still thinks that there is need for ventilation; and the only way of overcoming the difficulty is 'by the employment of fans' . . . Most people would rather put up with a little hot air than introduce the gas engine driven fans," &c. My recommendation of the use of fans comes as a necessary sequence to the following, based on a change from gas to electric lighting, see p. 17 of "A Ray of Light."

Dr. W. A. Aikin, writing in the "British Medical Journal" upon the change of lighting of large halls, &c., from coal gas to electric, communicates the following: "The atmospheric conditions are now quite different, for the whole contamination is the effect of human exhalations. . . . Such air becomes unfit for respiration much earlier than when carbonic acid alone has to be considered, *and the necessary air change is certainly retarded by the absence of gas-burners.*" There is only one way of overcoming this difficulty, and that is by the employment of fans. The motive power for these may either be from gas-engines or electricity, according to circumstances.

It is unnecessary for me to deal further with Mr. Rawlings. Perhaps the next time he essays to measure swords with his competitors, he will substitute facts for personalities, and hard figures for sarcasm. Such treatment of his subject will be worthy of the steel of his opponents, win their respect, and add to the pleasure and zest of honourably fought-out controversy.

Sandwich, Jan. 16, 1903. T. EBENEZER PYE.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.
Thursday, Jan. 15.

(*Before the* LORD CHIEF JUSTICE *and* JUSTICES WILLS *and* CHANNELL.)

Thomas Bray v. Sheffield United Gaslight Company.

This was an appeal by the plaintiff, Thomas Bray, who was a workman employed in the retort-house of the defendant Company, against a judgment of the late Judge Waddy, in the Sheffield County Court, dismissing his claim for a fortnight's wages in lieu of notice.

Mr. H. W. WILBERFORCE appeared for the appellant; Mr. TINDAL ATKINSON, K.C., represented the respondents.

Mr. WILBERFORCE, in opening the case, stated that the plaintiff was employed by the defendants at the latter part of 1901. In the retort-house was exhibited a set of rules, No. 13 of which set forth that fourteen days' notice in writing was required from retort-house men who had worked fourteen consecutive shifts, before they could leave the Company's employment; and the same notice would be given by the Company, except in cases mentioned in a previous rule, which referred to misconduct, and which it was admitted had no application in the present case. On the 7th of December, the Company served on the plaintiff a printed notice in the following terms: "I, on behalf of the Company, hereby give you notice that at the expiration of two weeks from this date your services will not be required, except on daily engagements." This was signed by the Manager. The notice expired on Dec. 21, and on the 22nd, 23rd, and 24th the plaintiff was employed, but not again until the 28th. On that day he asked if there was any work for him, and was told to go to his usual place in the retort-house. He went to work, and continued, with the exception of one or two days, until the 8th of March, when he was told that his services were no longer required. As he had then worked considerably more than fourteen consecutive shifts, he contended that he was entitled, under rule 13, to a fortnight's notice. The defendants held that he was only a daily workman after the notice of the 7th of December; and the learned Judge, without giving any formal judgment, said he felt compelled reluctantly to find for the defendants.

Mr. TINDAL ATKINSON submitted that the question was purely one of fact, that there was no appeal, and in any case the decision was right, the plaintiff having, when he returned to work after the expiration of the fourteen days' notice, made a new contract under which he was simply a daily labourer, liable to dismissal, or entitled to leave, at any time. He said the case did not call for any lengthy argument, because the amount in question was only £3 10s.; and if the defendants were held to be wrong, they would simply have to alter the terms of their notices.

The LORD CHIEF JUSTICE, in giving judgment, said he was of opinion that the learned Judge had come to a wrong conclusion as a matter of law. If he had decided, as a matter of fact, that the man had been engaged on terms which would have excluded him from the benefit of rule 13, the Court would not interfere; but both sides were agreed on the facts as stated by Mr. Wilberforce—that, having been employed under circumstances in which he was undoubtedly working under the rules of the retort-house, he received notice in December that at the expiration of two weeks his services would not be required except on daily engagements. He was then re-engaged, and worked for several months; and it was admitted that he had done many more than fourteen consecutive shifts. The question was whether or not—the rules still standing in the retort-house—the Company could say he was no longer entitled to the benefit of them, and was not under the liability thereby imposed. It seemed to him that the terms of the rules showed that they were intended to control the relations between the Company and the men employed in the retort-house, whose wages were calculated by the day, and whose obligations to the Company depended on the number of days they worked, and were not intended to apply only to weekly servants. Rule 13 said "fourteen days' notice in writing is required from retort-house men who have worked fourteen consecutive shifts." Obviously the reason of this was that it was very undesirable to have a sudden change in the retort-house men, which would affect both the quantity of gas produced and the fuel consumed; and the object was to prevent having a number of inexperienced men suddenly introduced. There was a corresponding privilege that the same notice would be given by the Company, except in cases described in a previous rule, which did not apply here. When the plaintiff came back on a daily engagement, the notice was still up in the retort-house; and it seemed to him the presumption was that he came back on the terms of the rules, except in so far as any special bargain excluded those rules, or the terms of his engagement prevented their being operative. Having come back, and been taken on as a retort-house man, and after fourteen consecutive shifts, he became a person whom the Company could retain if they wished for fourteen days, before he could claim to go; and, on the other hand, he was entitled to say: "You cannot dismiss me without fourteen days' notice." He thought, therefore, that the judgment of the Court below should be reversed, and that the plaintiff should recover his wages in lieu of notice.

Justices WILLS and CHANNELL concurred.

The appeal was therefore allowed, with costs.

THE TESTING OF GAS ON SUNDAYS.

In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Joyce, Mr. Hughes, K.C., representing the London County Council in the proceedings that have been instituted by them against the South Metropolitan Gas Company, moved for an injunction. He explained that one of the duties of the Council was to test the gas supplied by different Companies within the Metropolis for

its illuminating power, purity, and pressure. It had been the practice to make the tests on week days only; but, for reasons into which he need not go, they considered it necessary or advisable to make occasional tests on Sundays. The Companies objected, and said the Council were not entitled to test on Sundays. He could not say that the motion was of an urgent character; and he suggested that it should stand over for early trial. Mr. Warmington, K.C., for the defendants, remarked that his friend could bring on the motion if the matter became urgent. His Lordship said the motion would stand till the trial, with liberty to apply to advance; and facilities would be given for an early hearing.

THE CLAIM IN THE AUSTRIAN LAW COURTS AGAINST BARON AUER VON WELSBACH.

Judgment of the Court in Favour of Baron Welsbach.

At the conclusion of the report, in the "JOURNAL" for December 30 (pp. 1756-1760), of the hearing of this case in the Vienna Law Courts, it was stated that the President of the Court announced that the judgment would be delivered in writing to the parties. It will be remembered that the action was brought by Baron Auer von Welsbach against an Engineer, named Bernhard Rund, to establish that the latter had no claims on him in respect of the invention and patent rights of the present Welsbach mantle, for which, it transpired, Baron Auer had made application for an Austrian patent on Aug. 10, 1891. The interest of English readers of the "JOURNAL" in the case centres, for the most part, in the evidence given as to the date of the invention of the present Welsbach mantle. We give below a translation of the judgment, which was delivered to the parties on the 12th inst. It runs as follows :—

It has been established: (*a*) That the defendant Bernhard Rund, in his capacity as publicly recognized partner of the former firm of "Rund and Co.," has not, and never had, in virtue of the agreement of the 2nd of February, 1891, any just claim to require that the plaintiff should communicate to him the separate pieces of experimental work, and the experimental results, which as a whole led to the Austrian patent rights which were applied for on the 10th of August, 1891. (*b*) That the defendant, in virtue of his having been partner in the firm of Rund and Co., has never possessed any legal right to require that the invention, for which an application was made on the 10th of August, 1891, by the plaintiff for Austrian patent rights, should have been communicated to him. (*c*) That the defendant has no legal right to require of the plaintiff that, according to the agreement for repurchase, dated June 23, 1891, made between the plaintiff and M. E. Oesterreicher, the firm of Rund and Co. is to remain unaffected, the defendant to be the sole proprietor of this firm, and of its incandescent gas-light business, and that he is to be admitted to partnership by the plaintiff.

The defendant (Rund) is condemned to pay to the plaintiff (Baron Auer), within fourteen days, the costs of the proceedings, which, exclusive of judgment fees, which are to be specially reimbursed, amount to 4764·05 kronen (equal to very nearly £200).

Gas-Mains and Tramway Lines at Ilford.

It may be remembered that on the 17th of June last Major-General Hutchinson, R.E., conducted an inquiry, in the nature of an arbitration, at Ilford, on behalf of the Board of Trade, into a complaint made by the Ilford Gas Company against the Urban District Council of interference with their mains by the construction of a tramway. In the execution of this work, the laying of the concrete bed and the formation of earthenware chambers for the cables had prevented the Company from connecting service-pipes to the mains or getting at others already laid. Their Engineer (Mr. J. H. Brown), Mr. E. H. Stevenson, and Mr. J. Swinburne supported their contentions, which were denied by the Council, for whom Mr. W. A. Valon gave evidence. In the result, the Arbitrator decided that the Council were to relay the mains for a distance of about 2½ miles, and bear the expenses of the arbitration. The Council appealed against this decision; and the matter was heard by a King's Bench Divisional Court, composed of the Lord Chief Justice and Justices Wills and Channell, last Friday and again yesterday. Without calling upon Counsel for the Company, the appeal was dismissed, with costs. A report of the case will appear next week.

Wrongful Removal of a Gas-Engine on Hire.

At the Walsall County Court, last Wednesday, his Honour Judge Roberts delivered judgment on an application made to him last month by the Official Receiver for the committal for contempt of Court of Mr. Samuel Axon, the Birmingham representative of Messrs. Crossley Bros. The facts briefly were that on the 1st. ult. the Official Receiver took possession of the estate of Mary Taylor, harness manufacturer, of Walsall, a bankrupt, whose effects included a gas-engine hired from Messrs. Crossley. Subsequently the respondent communicated with the Official Receiver with regard to a proposed removal of the engine, but was informed that this could not be allowed, though an assurance was given that Messrs. Crossley's position should not be prejudiced. The respondent, however, visited the works and forcibly removed the engine, of which he still held possession. The case for the respondent was that the hiring agreement provided that, in case of bankruptcy, Messrs. Crossley should have the right to take possession of the engine at their will; and it being their own property, there was nothing wrongful in its removal. His Honour said he was satisfied that the interference with an Official Receiver was contempt of Court, and the argument that a person could take possession of his own effects from the Official Receiver appeared to him entirely contrary to the spirit of bankruptcy legislation. In making an order for the respondent's committal to Stafford Gaol for 21 days, the Judge said that, on being satisfied that the respondent was desirous of submitting to the Court, he should be willing to entertain an application for his release.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL AND THE GAS COMPANIES.

An Open Letter to the Members of the Council, on Sunday Gas Testing, &c., by Sir George Livesey.

1.—At the meeting of the Council on the 16th of December last, Mr. W. C. Johnson challenged the statement in the Company's letter of the 11th of December, 1902, that he had "probably misled the Council by the wholly erroneous statements made" in his speech on the subject of Sunday gas testing at the Council meeting on Nov. 18 last. In reply to his request for information, the Secretary has sent to Mr. Johnson a report of his speech with the errors, some ten in number, underlined, a copy being appended to this letter.

2.—At the Council meeting of the 16th ult., Mr. Johnson said he had read the report of his previous speech in the "JOURNAL OF GAS LIGHTING," which "consisted of about 30 lines, and with every word of it, with the exception of half-a-line, he was in entire agreement as being absolutely accurate." The sole correction he made was the substitution of "the Chief Gas Examiner" for a "Magistrate." Therefore Mr. Johnson's statement in the speech of the 18th of November that the proposed testing of gas on Sunday was to ascertain "whether or not the people of London were to be poisoned on that day" stands as, in his opinion, "absolutely accurate." His animadversion on the comment of the "JOURNAL OF GAS LIGHTING" on Mr. Ward's statement also leads to the conclusion that he agreed with Mr. Ward when he said "that if the Council allowed it to go forth that no tests would be made on Sunday, they (the Gas Companies) would have a royal day for cheating."

3.—If this opinion of the Gas Companies were held by only two members of the Council, I would take no notice of it. But I cannot but feel that they only gave expression to the real opinion of many of their fellow-councillors (possibly a majority); and, if so, there is no necessity to go farther in search of a reason for the existing relations between the Council and the Gas Companies. I do not know in what businesses Messrs. Ward and Johnson and other members of the Council who think with them are engaged, but I have no reason to believe they conduct them other than honestly. If I were to say publicly what they have said of the Gas Companies—in fact, of me, as the head of one of those Companies, and of the responsible officers associated with me—that, unless closely watched, they would cheat their customers, I should very properly be called to account in a Court of Law for a gross libel or for slander.

4.—What reason is there for thinking so badly of the Gas Companies? You may not be satisfied with the way they conduct their respective businesses. There may be incompetence, but there is certainly not dishonesty; and such a charge ought not to be made or entertained without the clearest evidence. The evidence given by the Council to Mr. Oldroyd's Committee in 1900 was, by its innuendoes and suggestions, certainly to this effect; but it utterly broke down when the other side was heard. Possibly in the protection of your Committee the charges of dishonesty, which could not well be put in quite plain language to the House of Commons Committee, have been so put; and the impression thus created appears to remain in the minds of a number of members of the Council. Therefore let me say that there is not the shadow of a foundation for the above-quoted statements of Messrs. Ward and Johnson, or for the suspicion that the gas of any of the Companies is less pure on Sundays than on other days. Less gas is made, and the standard of purity is at least always maintained. As to the illuminating power, which Mr. Johnson said on the 18th of November was not in question, the Council have been already informed that the stoppage of gas making—always for 12, and in many cases for 16, hours on Sunday—necessarily breaks the continuity of working; and without continuity of working, the production of gas of uniform illuminating power is impossible. A large quantity, estimated at 300,000 cubic feet, of poor gas is therefore blown away on Sunday mornings, and the quality of the rest is consequently rather above the average. The Sunday stoppage—solely for the purpose of giving a day's rest to the men—entails considerable expense on the Company; but the consumers do not suffer in any way, for if the illuminating power is by any chance a fraction of a candle below the standard, it is only for a short time in the middle of the day, when no gas is used for lighting. The South Metropolitan Company will, however, take the risk rather than employ men on Sunday.

5.—To ensure uniformity, gas making must be continuous; and since the recent institution by the Council of Sunday testing, the Commercial Gas Company have started Sunday work, making both carburetted water gas and coal gas during the whole of the day, employing at least 80 men who previously had the day's rest. The men do not complain—in fact, some at least like Sunday work. The Union obtained double pay for that day, with the avowed purpose of checking Sunday labour; but the effect on some of the men is not quite what was desired. The Council have shown very proper consideration for their regular gas testers in not giving them seven days' duty in the week, but not for the supernumeraries they have engaged, who also, presumably, have to work on the six week days. Neither have they considered the Company's caretakers, or the officials who will have to attend to see that the supernumerary testers do their work accurately; for the Company have found that when new testers are appointed it frequently takes them some time to learn how to test. To show that the Company have nothing to conceal, and in order to meet the expressed wish of the Council for occasional tests, I proposed that the regular testers should make them occasionally at reasonable times. Then if there should be an adverse test, the Council would be free to take proceedings, if they should consider it desirable, which the Company would resist on the ground that Sunday is a *dies non*. The Council have probably forgotten that in 1890 a precisely similar case to the recent one of the Commercial Company, of a slight excess of sulphur on the average of a Saturday and Monday, was decided in the Council's

favour by Mr. Bushby, the Police Magistrate. The Gaslight and Coke Company contended that, for the purpose of taking an average, Saturday and Monday were not successive days. The Council contended that they were, and that Parliament intended Sunday to be *dies non*. The Magistrate took time to consider his judgment, and gave it for the Council, and inflicted a fine on the Company. The Council succeeded then; and, notwithstanding Mr. Johnson's statement that they "could not succeed" in the recent Commercial case, they would, had they gone on, in all probability have been again successful. They have now, however, turned completely round.

6.—I must now draw attention to Mr. Johnson's erroneous use of the word "poisoned" in the sentence already quoted. Of course, if members of the Council believe that sulphur is poison, and that a trifle more or less can have the effect described, I can understand their concern for the public. But sulphur is not poison; and a fraction of a grain, which has caused all this trouble, or even a good many grains, more than the prescribed limit of 22 in 100 cubic feet of gas, do not the slightest injury to, nor produce the slightest effect on, the consumers of gas. If the Council were to come into possession of the gas-works, they would at once close all the testing-stations, and most wisely drop all testing for sulphur compounds, as is done by almost all other municipalities owning gas-works. There is not a city on the Continent that takes any notice whatever of the sulphur compounds, or makes any tests to discover the quantity contained in its gas. In the winter in London, 22 grains in 100 cubic feet are allowed, or (say) one part in 1000 parts of gas, or 1-10th of 1 per cent. If no efforts were made to reduce the amount, the quantity would be about 35 grains in 100 cubic feet; and no one would be a penny the worse. In fact, the consumers of London would be a great deal better off, for they would save at the very least £150,000 a year on this item alone.

7.—Then there is another ridiculous refinement of testing. The Gas Companies have been, and are, penalized if the gas contains as little as one part of sulphuretted hydrogen in a million parts of gas—in fact, it has been shown that one part in 10 millions will discolour the test-paper, and make the Companies liable to a penalty. To meet this absurd test, the Companies have had to increase their purifiers 50 per cent. The South Metropolitan Company's outlay on these additional purifiers has not been less than £60,000, which the consumers have had to pay, in addition to all the cost of working these extra purifiers.

8.—Then as to illuminating power. This Company in 1900 were authorized by Parliament to reduce the standard from 16 to 14 candles. That reduction took place from Midsummer, 1901. It was predicted by the Council's witnesses that it would entail enormous loss on the consumers, who would be compelled to greatly increase their consumption of gas to get the same amount of light. There has been practically no increase of consumption due to the reduction of illuminating power; and the Council now appear to be convinced that they were mistaken, for they are actually promoting a Bill having for one of its chief objects the reduction of the illuminating power on the north of the Thames from 16 to 14 candles. They are also going to ask Parliament to reverse its decision of 1900 as to testing, which will, if assented to, have the effect of increasing the illuminating power of the South Metropolitan Company's gas from 14 to 15 candles. The Council were fully represented, and strenuously—I might use a stronger word, and say bitterly—opposed the Company's request for the reduction, for which the Company gave more than an equivalent in a reduction of 2d. in their initial price. The testing clause was inserted, with the cognizance of the Council, openly by the Committee, after full discussion; and now the Council are seeking to depart from the bargain then made. Should they succeed, useless enrichment will again become necessary, on which at least £200,000 a year of the consumers' money has been for many years wasted in London. I venture to say the consumers of this Company's gas have not asked the Council to go for this alteration of the bargai nof 1900; they do not want it; and they will not thank the Council for the addition to their gas bills if the Council should by any chance succeed. The Council have never yet grasped the fact that the sliding-scale really makes the consumers partners with the Companies. Every saving in manufacture that can be effected is shared with the consumers in the proportion, in the case of this Company, of six to the consumer and one to the shareholders; and every addition to the cost of making gas is paid for to the extent of six-sevenths by the consumer and one-seventh by the shareholder. To identify the interests of the two parties was my object in proposing the sliding-scale nearly thirty years ago; and that object has been attained. In conjunction with the auction clauses introduced at the same time by the late Lord Farrer, the interests of the consumers are completely and thoroughly protected, because they are made one with the interests of the shareholders. If these provisions do not succeed in producing cheap gas, the reason must be sought elsewhere; and no outside interference, either of the Council or Parliament, can do anything worth troubling about. For instance, the Council have been trying for a good many years to get cheap gas for North London, and so far have entirely failed, and will fail. The Gaslight and Coke Company are entitled to a dividend of £4 18s. per cent. on their ordinary stock, under the sliding-scale; but they are only paying 4 per cent., which amounts to a total for the year of £609,728—say, £610,000. At one time they paid on their unconverted stock the equivalent of 5½ per cent. on their present stock. This reduction of 1½ per cent. represents a loss to the shareholders of £228,648 on their year's dividend—a fine, in fact, of nearly a quarter-of-a-million for charging a higher price for their gas. If such a stimulus to lower their price is not effective, what can outside pressure be expected to do? All that the Council can do is to worry the Company, and especially their executive officers, by working the extremely stringent system of testing with the utmost strictness with its fractions of candles and fractions of grains, not only doing no good to the consumer, but actually doing him harm by increasing the cost of gas directly, and indirectly by distracting the attention of the managers from infinitely more important duties. Further, there is another powerful incentive to reduce the price, in the competing methods of illumination which have absolutely destroyed the monopoly that gas companies once possessed. Consumers who are not satisfied with gas give it up. This is an effect of high prices and a cause of their maintenance, for with a diminishing or a non-increasing business reductions of price become extremely difficult. If the shareholders under such a stimulus cannot make the management reduce the price, there is little hope of success from any other quarter. At any rate, the maintenance of their present price is not the fault of the sliding-scale. To prove my contention that the interests of shareholders and consumers have been really identified and made one by the sliding-scale and auction clauses, I can say that the South Metropolitan Company have repeatedly reduced their price in advance, or before the accounts to date justified it; and, on the other hand, on the rare occasions when, owing to great increases in the cost of coal, an increase of price became necessary, such increases have been delayed as much as possible—in fact, much too long in 1891, when the advance was only made when the reserve fund was all but exhausted. Moreover, the Company have constantly gone short of the dividend to which they were entitled under the sliding-scale. I here give the amount of the dividend foregone in the last 14 years:—

Year.	Price of Gas per 1000 Feet. s. d.	Dividend Paid. Per Cent. £ s. d.	Dividend Foregone. £
1889	2 3	5 1 0	22,404
1890	2 3	5 0 0	24,940
1891	2 4	5 4 0	9,938
1892	2 6	5 4 0	..
1893	2 5	5 4 0	2,637
1894	2 4	5 4 0	10,689
1895	2 3	5 4 0	13,496
1896	2 3	5 4 6	15,055
1897	2 3	5 5 0	13,828
1898	2 3	5 6 8	9,333
1899	2 2½	5 6 8	17,810
1900	2 5	5 3 4	1,880
1901	2 5½	5 0 0	9,750
1902	2 3	5 6 8	..
			£151,760

9.—Thus the shareholders have foregone £151,760 of dividend to which they were entitled owing to the anxiety of the Company to sell gas at the lowest possible price. The Directors have three interests to consider, but happily not separate interests; for by the sliding-scale they have all been made one. The sliding-scale has been extended to the employees, whose annual profit-sharing bonus is dependent on the price of gas. If it goes down, the bonus increases; and if the price rises, the bonus is reduced.

10.—The three interests are the consumers, the employees, and the shareholders. I cannot say which should be first, and have therefore placed them alphabetically; but I can say that the first two have not suffered in any way. The consumers have had gas at the lowest possible price. The employees have had fair wages, and when, as in 1898, trade was very good and there was a scarcity of labour, this Company, acting in accord with the law of supply and demand, and without any pressure, took the lead in advancing stokers' wages 1d. per hour—from 5s. 4d. to 6s. for an eight-hour shift.

11.—The total amount distributed under the profit-sharing arrangement since it was started in 1889 is £196,747; and one result is that the employees have now invested in the Company, either in stock or on deposit, £160,000.

12.—Last year the Company contributed to the workmen's sick, accident, and superannuation funds £5320, which more than doubles the subscriptions of the men.

13.—I claim no undue credit for all this. By reducing the price of gas apparently to the detriment of the shareholders at the time, the business has been strengthened, and enabled to meet and hold its own in the competition of rival lights and sources of power; and by treating the workmen liberally and considerately, and trying to improve their position, better work has resulted, and the consumers and shareholders have, as a result, gained rather than lost.

14.—I may say a word on the raising of new capital. The Company are authorized to offer it to consumers and employees at a fixed price, not more than £5 below the average market value of the preceding four weeks. They are now offering £100,000. The average market price was £118; and, that being so, the price of issue might have been fixed at £113. But the Directors, believing that the market price was temporarily depressed, fixed the price of issue at £120—again proving that the interest of the shareholders runs with that of the consumers of gas generally in favour of cheap capital. Why do I trouble you with all this? Simply because I believe you do not understand the business of gas supply, and have a wrong impression of the action and policy of the Companies. Their object is identical with yours—viz., to serve the public well and cheaply. If, instead of always being at arms' length, a better understanding could be created between us, it would certainly be for the public advantage. I earnestly desire such an understanding as will result in co-operation with you in place of the present most unsatisfactory relations.

15.—May I, in conclusion, introduce a personal matter? My life has been devoted to the supply of gas in London; and I can say without boasting that the consumers of London have never had a better friend. If I have not in every way earnestly endeavoured to act honestly, my life has been a failure. Do the London County Council wish to drive me out, for their actions certainly bear that construction? In three months I shall have passed my 69th year; and I sometimes ask myself why I continue at work, and subject to the worries of the business, caused mainly by the Council, for otherwise the business would be a pleasure. I do not hold office for the fees I receive; had that been all, I should have given up years ago. But I hold on for the same reasons that influence you. If, as I believe, my services are a benefit to the consumers of London in cheapening the supply of gas, and to the employees of this Company in reconciling capital and labour, I must keep on as long as, in the providence of God, health and strength last; and I will not yet despair of hearty co-operation with the London County Council.

GEORGE LIVESEY.

London, Jan. 16, 1903.

Report of Mr. W. C. JOHNSON'S speech, taken from the "JOURNAL OF GAS LIGHTING," which Mr. Johnson says is "absolutely accurate"

with one exception—that "Chief Gas Examiner" should be substituted for "Magistrate."

[The errors are printed in italics.]

Mr. W. C. Johnson assured the Council that the Committee had no
(1) wish in any way to encourage Sunday labour. *This move had been forced upon them by the action of the Gas Companies themselves.* He
(2) might remind the Council that this was *not, as yet, a question of testing the gas for its illuminating value*, but for its purity; and he would inform Colonel Rotton that it was not a question of ascertaining the
(3) candle power of the gas on Sunday, but *whether or not the people of London were to be poisoned on that day.* The case on which this
(4) matter arose *was an action brought against the Commercial Gas Company*, because in the manufacture of their gas they allowed to remain in it too large a quantity of sulphur. Under the Act, they might for
(5) two consecutive days have more than a certain quantity; and *for the Council to be successful in prosecuting them*, they had to prove that for three consecutive days this quantity had been exceeded. They found
(6) this had been done on Friday, Saturday, and Monday; and *the Company were brought before the Magistrate* [Chief Gas Examiner]. But
(7) as the test had not been taken on the intervening Sunday, *the Council*
(8) *could not succeed. This had consequently checked the Committee in their efforts to secure the purity of the gas.* Since then the matter had assumed greater importance; but he could assure the Council, on behalf of the Committee, that nothing would be done to cause an increase of Sunday labour, without its being absolutely necessary. Both
(9) he and the Committee were aware that the Gas Companies held *a threat* over their heads. But, strangely enough, the Gaslight and Coke Company allowed the Examiners on the first Sunday to test the gas in their stations without protest; and they found that in only a very small proportion of instances was there any superfluity of sulphur. As the Company had no notice of the test, they employed no
(10) extra labour to keep the gas up to the standard. *The Committee had every reason to believe that this was a got-up cry on behalf of the Companies, in order to frighten the Council and the Committee.* He hoped the Council would accept the recommendation.

SULPHATE OF AMMONIA MARKET.

Messrs. Bradbury and Hirsch's Review for the Past Year.

We have received from Messrs. Bradbury and Hirsch, of Liverpool, a copy of their "Review of the Market for Sulphate of Ammonia during 1902;" and, as on previous occasions, we extract therefrom those portions which most closely concern our readers.

Messrs. Bradbury and Hirsch open their report by expressing the opinion that the past year will remain as a memorable one in the minds of all British citizens, inasmuch as with it they will associate the termination of the most costly and protracted war which had been carried on since the great Civil War in the United States. They will also remember it in connection with the Coronation of a beloved Sovereign under circumstances which touched not only the deepest feelings of his own subjects, but also the sympathies of all kindred nations. The brilliant gathering of native Indian Princes at Delhi to celebrate the same event, though naturally of less importance, will also be long remembered. The opening in December of the barrage at Assuan will also, they think, be associated with the year 1902; and, if it becomes the means of turning a desert into a garden, the Egyptian fellaheen will most of all have reason to remember the occasion. In general interest, too, the past year was a remarkable one. While statesmen were combining to abolish sugar bounties, and by that means place the sugar industry upon a natural and Free Trade basis, capitalists in many directions combined for the purpose of extinguishing or crippling individual and private enterprise. The past year was pre-eminently one of trusts and combines; and Messrs. Bradbury and Hirsch have a notion that the current one may reveal developments not expected and not desired by the leading combiners. It seems to them to be perfectly clear that the ultimate can never be reached by combination experts. They can never afford to stand still. They must go on combining and absorbing; and although paper may in the main serve for a time, they must reach a point when hard cash will be required. This will be when the pinch will come.

This, however, is a matter somewhat extraneous to the subject of the report; and therefore the authors proceed to consider one more closely allied to it—viz., the industrial and agricultural situation. The year 1902 was entered upon with a not very promising industrial outlook; but they think it proved to be in some respects more satisfactory than was expected. With regard to the manure trade—the one with which sulphate of ammonia is most intimately associated—they place themselves in the position of the manure manufacturer, and look at the subject from his point of view. Although a large acreage of land was worked in January, operations had to be suspended all through February, and it was not until March that the manure season fairly set in. The bulk of the trade had consequently to be compressed into two months, or, at all events, into much less than three. But notwithstanding this, Messrs. Bradbury and Hirsch think the volume for the whole season would compare favourably with that for any recent spring season; and this opinion is confirmed by most of the manure manufacturers with whom they have conversed. As to the outlook for the current year, they consider the agricultural situation improved, compared with that at the end of 1901, and that the export demand for superphosphates is better assured. Manufacturers have again covered their requirements in phosphatic material at bed-rock prices, and, in the authors' opinion, have not overloaded themselves. Bone material has within the past six months become scarce and relatively dear, having regard to the price of superphosphates; but this has come to be of less and less importance each year. Nitrogenous material has also been dear, and manure manufacturers have, in the main, refrained from buying extensively ahead. Sulphate of ammonia starts on a much higher level, and there is therefore less room for a further advance. A hand-to-mouth policy would, for this reason, seem to be not imprudent.

Coming to nitrate of soda, Messrs. Bradbury and Hirsch point out that the situation at the outset was one of exceptional interest. On the one hand, dealers and importers, who controlled the bulk of the supply (stock and afloat), were confident of their ability to govern the market, fortified as they were by a strong statistical position. On the other, distributors and consumers, who had missed their opportunity for covering their requirements before the advance, stood stolidly aloof. There was a decrease of nearly 25 per cent. in the consumption in the United Kingdom during the six months January to June; the actual deliveries (including those for the Continent) being 735,000 tons, compared with 920,000 tons in 1901. The visible supply (stock and afloat) at the end of 1902 was about 640,000 tons, compared with 600,000 tons for 1901 and 800,000 tons for 1900. There is therefore an increase of 40,000 tons as compared with the visible supply at the end of last year, but a shrinkage of 160,000 tons as compared with 1900. The question is asked: Is the supply going to be too little or too much? If consumption is to be anything approaching that for January-April, 1901, which was 720,000 tons, the supply will not be enough; but if it is only to be on the reduced scale of that for January-April, 1902, the supply will be too large. The question of consumption being, therefore, the vital one, the authors next address themselves to it. The conclusion they arrive at is that what may reasonably be expected amply justifies the present level of prices, and that, in the absence of any "cornering" movement, such as was attempted last spring, the supply will not greatly exceed the demand.

As to sulphate of ammonia, Messrs. Bradbury and Hirsch remark that it is not always possible for a reviewer to present a favourable report, and at the same time to be quite candid; but they say they are in the fortunate position of being able to do the one thing and to be the other. Without any argument on their part, we think their friends will admit that the past year's working proved far more remunerative than anybody anticipated. When discussing the situation at the end of 1901, it appeared to them that the position of sulphate of ammonia was well assured. At that time the price of nitrate of soda was 17s. 6d. per ton higher than it was at the opening of the year, while the price of sulphate was a shade lower. Germany had for some time been buying sulphate on an increased scale, no doubt mainly on account of its relative cheapness; and there was no indication of failing demand from any country. They knew, too, that the forward speculative selling in December, 1901, at spot prices, was only done for the purpose of enabling operators to cover their December contracts favourably by keeping consumers out of the market; and they thought the manœuvre was not well advised. Their opinion was that an advance in the price of sulphate was justified. By the side of the upward movement in nitrate of soda, however, all other considerations became unimportant. For at least five months the price of nitrate was the dominating factor in the sulphate trade, causing, as it did, an almost uninterrupted advance to a level for which a precedent must be sought as far back as 1894. Though nitrate collapsed in April, it was not until June that there was any set-back in sulphate. There was, in fact, an important advance in the price both in April and May; and even in June the decline was relatively unimportant, though under ordinary circumstances it would have been considered important. In the second half of the year, nothing like disaster at any time overtook the market such as happened to nitrate of soda in April and May, though, as was to be expected, prices were prejudicially affected by nitrate. In July and August, however, owing to the gloomy market for this product, there was a good deal of selling ahead, partly first hand and partly speculative, at prices not at all justified by subsequent events; but sales made for forward delivery after the middle of September by makers were mostly well advised, though this cannot be said of much of the speculative selling. Towards the end of November, when outstanding November contracts had to be covered, it was found that supplies were by no means abundant—that elasticity in production had somehow failed.

The first note of alarm was given by extensive purchasing, by one or two large operators, right up to June, at prices rapidly advancing from £11 15s. to £12 2s. 6d. per ton f.o.b. Leith, and at corresponding prices in London, until the demands of makers got beyond bounds. The authors consider it highly probable that an important quantity was bought secretly for large continental distributors; but for the most part consumers refused to be interested, not realizing that supplies could by any possibility be deficient, or believing that the gap could easily be filled by nitrate of soda. The activity in the forward position was not long in reflecting itself upon the spot market; and everything available was readily disposed of at advancing prices, the activities of buyers being materially quickened by the increasingly strong position of nitrate. As with forward, so with spot. Buyers abroad were very slow in coming into line; and it was only in the second half of December, when there was no escape from the hard facts of the situation, that they came fairly abreast. Before passing from this part of their review, Messrs. Bradbury and Hirsch compare the average prices of nitrate of soda with those of sulphate of ammonia, in order to show that the more deliberate movements during the past year in the latter article work out quite as well as the fitful fever and subsequent collapse in the former. Though for January to June nitrate of soda makes the better show, relatively—viz., £9 17s. 11d. against £11 15s. 7d. per ton—the averages for the whole year work out to £9 6s. 8d. per ton for nitrate and £11 16s. 3d. per ton for sulphate, or within a fraction of their proper relative values. If the average price of sulphate for 1902 is compared with the averages for previous years, they think manufacturers will find still greater cause for satisfaction; £10 11s. 4d. and £11 2s. per ton respectively being the averages for 1901 and 1900. It is necessary to go back to 1894 to find a better record; and this was only achieved by withholding production from the market.

Exports last year beat all previous records; and, apart from this fact, they are of quite exceptional interest, owing to the fluctuations in the takings of the different importing countries. Messrs. Bradbury and Hirsch have therefore given three tables, showing the shipments from January to April, January to June, and January to December for the years 1897 to 1902. The first shows that France, Germany, and Belgium—the nitrate-consuming countries—took within the four months 13,700 tons more than during the corresponding period of 1901; and though the cultivation of cereals in place of beet may in itself have occasioned an extra demand for sulphate of ammonia, and

though there may have been some shrinkage in the home production, the authors think there can be no question that relative cheapness was the determining cause of the exceptional demand for British production. Towards the end of 1901, the shipments to Germany were unusually heavy; so that the 13,700 tons would not nearly represent the whole of the extra Continental requirements for January to April. There was a marked falling off in the shipments to Holland and the sugar-growing Colonies—the only exception being those to British Guiana; and they think the circumstances surrounding those Colonies at the time and the advance in price, taken together, account for it. The third table, covering the whole year, shows that while the shipments to France after June were practically the same as those for July to December, 1901, those to Germany over the same period show a shrinkage of 3500 tons. Moreover, the short shipments to Germany were in November and December only. The demand for Spain was remarkable during the second half of the year, being more than 3000 tons in advance of the corresponding period of 1901. While the shipments to Java from January to June were 4000 tons behind those for January to June in 1901, shipments for the whole year show an excess of about 1300 tons—that is to say, an improvement of more than 5000 tons in the second half. Home consumption was below the level of previous years; the high range of prices reached compelling economy among farmers, and telling against the export of high-class manures into the composition of which sulphate of ammonia largely enters.

Turning their attention to the question of production, Messrs. Bradbury and Hirsch remark that the output from power-gas works is perhaps the most interesting, though far from being the most important, feature. In their last "Review," they made special reference to the Mond process and its possibilities as a source of sulphate of ammonia, and they now return to the subject. They remark:

> As yet the output in the United Kingdom is not more than about 4500 tons, but within the next twelve months this quantity will be largely increased. So far the installations already at work, or where the necessary plant is in progress, in the United Kingdom, represent a coal capacity of about 1400 tons per day. It is, however, only in the case of the large installations where sulphate of ammonia can be recovered advantageously; but it may be interesting to work out what the capacity would be if sulphate of ammonia were universally recovered at the theoretic rate—90 lbs. to the ton of coal—and if there were no stoppages. Well, 1400 tons of coal per day would yield 56 tons of sulphate of ammonia per day, or upwards of 20,000 tons per annum. Even when allowance is made for the smaller works, which do not count, for the reason stated, it needs but the gradual adoption of the process by larger works to bring about the production of not only 20,000 tons of sulphate of ammonia, but a still larger quantity. That time is not yet, however; but it must be looked for in the not very distant future.

Owing to the closing of one of the large oil-works in Scotland, the production of sulphate of ammonia from shale shows a decline upon last year's output. That from iron remains about the same, for although there has been in some departments great activity, owing to American demand for iron, there has been depression in shipbuilding; and so far as sulphate of ammonia is concerned, the one about balances the other. From coke and carbonizing works there has been an increase, but not of any great importance. The increased output from gas-works was also insignificant last year. This absence of elasticity can only be accounted for, Messrs. Bradbury and Hirsch say, by the larger use of electricity and of water gas. Then oil gas—or, as it is more commonly called, water gas—has been more largely supplied in London and other cities and large towns, involving a further displacement of coal gas and a consequent reduction in the output of sulphate of ammonia. Of course, in smaller towns, and in places where electricity and water gas do not seriously compete, there has been a substantial increase in the consumption of coal gas; and this accounts for the larger output of sulphate of ammonia in the aggregate. Messrs. Bradbury and Hirsch estimate the production of ammonia, calculated into sulphate (including that used in the manufacture of ammonia soda and in other chemical processes), from all sources in the United Kingdom during 1902, at 221,500 tons, apportioned as follows:—

	Tons.
Gas-works	146,000
Iron ,,	17,000
Shale ,,	38,000
Coke and carbonizing works and producer gas	20,500
	221,500

Of this production, they reckon that England contributed 145,000 tons; Scotland, 74,000 tons; and Ireland, 2500 tons. The output during the previous five years (in tons) was as follows:—

	1901.	1900.	1899.	1898.	1897.
Gas-works	143,000	142,000	134,000	130,000	133,000
Iron ,,	16,500	17,000	18,000	17,700	18,000
Shale ,,	40,000	37,000	38,500	37,300	37,000
Coke and carbonizing works and producer gas	18,000	17,000	15,000	11,500	10,000
Totals	217,500	213,000	205,500	196,500	198,000

Their estimate of the production from gas-works in 1901 was rather over the mark, while the production from shale was under-estimated. Having regard to the very heavy shipments in the early months of 1902, they are inclined to think the stock brought forward from 1901 was larger than they supposed—that it was, in fact, 13,000 or 14,000 tons. Assuming that the stock was 14,000 tons, the account for 1902 will stand as follows:—

	Tons.
Stock brought forward from 1901	14,000
Production in 1902	221,500
	235,500
Exports in 1902	162,750
Home consumption (for all purposes) in 1902	63,750
Stock to carry forward into 1903	9,000
	235,500

The year 1903, therefore, opens with a reduced stock—in fact, a bare working stock; and Messrs. Bradbury and Hirsch think the position of sulphate is as secure as it has been at the beginning of any recent year. With regard to the future, their opinion is that, in the main, the course of the sulphate market will be determined by the market for nitrate; and that the fortunes of the latter will depend upon the policy pursued by beet growers. At present prices, they are satisfied the moderate supplies of both articles will find a ready market.

The "Review" concludes with the usual record of the course of the market month by month; and this is followed by the customary tabulated statistics. The first table contains the comparative weekly prices of sulphate of ammonia and nitrate of soda last year. In the week ending Jan. 4, sulphate was 10s. 9d. and nitrate 9s. 6d. per cwt.; on April 5, the prices were 11s. 9¾d. and 10s. 6d.; at Midsummer, they were 12s. 4½d. and 8s. 9d.; at Michaelmas they were 12s. and 8s. 7½d.; while at the close of the year they were 11s. 10½d. and 9s. 3d. respectively. The second table gives the average prices per ton of good grey (24 per cent.) sulphate, f.o.b. Hull; the figures ranging over 36 years—1867 to 1902. The following are the averages for the past ten years: 1893, £12 11s. 4½d.; 1894, £13 3s. 8½d.; 1895, £9 15s. 4½d.; 1896, £7 18s. 0¾d.; 1897, £7 18s. 4¾d.; 1898, £9 9s. 7½d.; 1899, £11 5s. 9¾d.; 1900, £11 2s.; 1901, £10 11s. 4d.; and 1902, £11 16s. 3d. The third table shows the average prices per hundredweight of 95 per cent. nitrate of soda, in Liverpool, for the past ten years. They are as follows: 1893, 9s. 5¼d.; 1894, 9s. 4¼d.; 1895, 8s. 2¼d.; 1896, 7s. 11½d.; 1897, 7s. 9¼d.; 1898, 7s. 6¾d.; 1899, 7s. 11¾d.; 1900, 8s. 5½d.; 1901, 8s. 11½d.; and 1902, 9s. 4d.

THE GAS-WORKS PURCHASE QUESTION AT WELLINGTON (SALOP).

An adjourned meeting of owners and ratepayers was held on Wednesday in the Wellington Town Hall, to further consider the proposal of the Urban District Council to purchase the Gas Company's undertaking, and oppose the Company's Bill giving them powers to increase their capital and to supply electric light. The meeting on the previous Wednesday (*ante*, p. 117) lasted 4½ hours; and since then the town has been flooded with literature in support of and against the Council's action. Dr. Hollies, the Chairman of the Council, again presided, and stated that since the previous meeting the Council had obtained the services of an expert, and arranged with him to come to Wellington and inspect the gas-works. The Directors of the Company, however, had resolved that it was impossible for them to accede to the Council's request. The expert referred to had valued the Company's works for assessment purposes last year, owing to the Directors declining to sell the undertaking by mutual arrangement for the benefit of the town; and the Chairman explained that £4000 would be the probable amount of parliamentary and arbitration expenses, which would have to be repaid in five years, and would entail, with interest, an annual payment of nearly £900. The Council did not, in fairness to the ratepayers, advise them to support resolutions for purchase, but were still prepared to buy the undertaking at a fair and reasonable price by mutual arrangement. However, as the Company's Bill contained several obnoxious clauses, the Council advised the ratepayers to support the second resolution for opposing it, so as to get the removal of the portion relating to the electric lighting monopoly and secure other modifications. Several members of the Council argued that, even on the conditions mentioned, the concern could be made profitable to the town. The first resolution for the purchase of the undertaking was put to the meeting and defeated; but the motion for opposing the Company's Bill was carried by an overwhelming majority. Mr. Carrane, Solicitor, demanded a poll of owners and ratepayers of the town on both resolutions.

RAILWAY ACCIDENT AT A GAS-WORKS.

A serious railway accident occurred on Monday of last week at the works of the Blyth and Cowpen Gas Company. From accounts published in the local Press, it appears that a North-Eastern Railway engine was pushing eight trucks of coal up an embankment leading to the Railway Company's staith at the harbour. By some means or other, however, the points leading to the gas-works were turned, and the set of trucks were rushed along the siding; and before the engine could be pulled up, the foremost ones were dashed into the retort-house. A number of workmen were about, and there were several narrow escapes; but fortunately no one was injured. Two trucks were standing in the retort-house when the accident occurred; and the men inside the building were just on the point of commencing to load the tar-tank on one of these trucks when the other coal-laden vehicles dashed in. They had just time to get clear as the incoming trucks banged into the stationary waggons. The impact was so great as to cause the foremost of the coal-laden trucks to jump the metals, and go right through the side of the brick wall into the yard. Two other trucks followed; but the fourth and fifth stuck inside the building. Half of one side of the retort-house collapsed; and half the roof also fell in. The quantity of *débris* scattered about was very great; and, in one way and another, it is computed that the repairs will cost at least £3000. The driver who had charge of the locomotive stated that he endeavoured to pull up immediately he noticed that the foremost truck had taken the wrong line; but the distance from the points to the retort-house, and the speed at which he was going, prevented this being accomplished. The work of clearing away the wreckage was promptly taken in hand by the Railway Company.

Messrs. W. C. Holmes and Co., of Huddersfield, have received the order for the retort-house fittings and ironwork and the annular condensers required in the completion of the second section of the gas-works extensions for the Wallasey Urban District Council.

ELECTRIC LIGHTING NOTES.

Fire and Failure in London.

On Monday morning last week, about half-past eight, an accident occurred in connection with the cables belonging to the City of London Electric Lighting Company at the corner of Bennet's Hill and Upper Thames Street. One of the cables, which had been in use for several years, suddenly failed and was burnt out. Some gas appears to have found its way into an adjoining post-office box, and while a fireman was engaged in removing the heavy lid the flame travelled back and slightly scorched him. The Chief Engineer (Mr. Frank Bailey) was quickly on the spot; and under his direction arrangements were made by which the supply of current was resumed as promptly as possible in the area affected.

Rhyl's Electric Lighting Accounts to be Investigated.

At the meeting of the Rhyl District Council on Monday last week, a discussion arose as to the electric lighting works. Mr. Clews said there was a very strong feeling among the ratepayers that there should be a proper statement of the affairs of the concern made public, especially after what had transpired at the recent Local Government Board inquiry (*ante*, p. 112). He moved that the whole of the accounts be investigated, and the cost of the electric light and refuse destructor apportioned under the various heads. Mr. Frimston, the Chairman of the Electric Light Committee, opposed the motion, on the ground that the Committee had regularly investigated the accounts as presented. It was in consequence of the enlarged works that they had increased the cost to £25,000. By nine votes to two, however, the Council agreed that a Committee should investigate the matter.

More Expenditure at Torquay.

It has been decided by the Torquay Town Council that steps shall be taken for the erection of a new generating station for the electric light undertaking. Some of the members demurred to the expenditure of so large a sum as would be required for this purpose, and suggested that the present station would answer requirements if the Corporation were not called upon to provide current for the working of the tramways. The Mayor (Mr. J. Taylor), however, contended that an early removal from the present restricted site was necessary if they were to keep pace with the demand; and he said that if anything went wrong with the plant (which was now overworked), a portion of the town would be in darkness. It was decided to erect the new station on land adjoining the refuse destructor; and the Borough Surveyor and Electrical Engineer are to prepare plans and specifications.

Failure of the Electric Light at Hull.

For several hours on Monday of last week great inconvenience was experienced in Hull owing to a failure of the municipal electric light supply, caused by a heavy short-circuit on the low-tension mains in Humber Street. At the Town Hall itself, it was found necessary to send out for candles, to enable the clerks to keep on with their work; while the large shops in the main streets had also to suffer the indignity of being lighted by candles stuck in bottles and other hastily-improvised holders. The management of the North-Eastern Railway Company's Station Hotel had good cause to mourn the premature removal from the building of the greater part of the gas-fittings; and several of the drapery establishments, now in the midst of their winter sales, had to suspend business for a time. In one of these shops there were hundreds of customers when the failure occurred; and in spite of all possible precautions being taken, it is feared that the firm have suffered somewhat through dishonesty. Fortunately for the theatres and music halls, the defect at the works was remedied about seven o'clock; but this was too late to be of advantage to most of the tradesmen affected, and it is believed that in many cases there was considerable pecuniary loss as well as inconvenience.

Electric Light in Farmhouses.

"Devonian" writes: Your Scottish correspondent, in this week's issue, speaks of an installation of electric lighting at a farm in Aberdeenshire as seeming "to mark a new departure in the lighting of isolated places." He and your readers may be interested to know that the Aberdeenshire farmer was anticipated at least fifteen years ago—I think longer—by a Dartmoor miller-farmer. At the foot of the hill leading to Castor Rock, in some of the most secluded and delightful scenery of Devonshire, the pedestrian taking a ramble by night from Chagford towards the moor, will come round a corner of the lane and see unexpectedly before him a strong, bright light. If he be not too nervous of Dartmoor "pixies" to investigate, he will find it proceeds from an electric lamp in the porch of a real old English farmhouse, built somewhere about the reign of Elizabeth. If he will call in the daytime, he can be shown a flour-mill, a bone-mill, a saw-mill, laundry-machines, boot-cleaning brushes, and an electric dynamo—all run by the power of one water-wheel actuated by a leat from the River Teign. The old farmer, who died some years ago, was one of the shrewdest men in the West Country; and his son is a worthy successor. They were certainly well ahead of our friend in Scotland.

A Local Government Board Warning at Halifax.

Mr. E A. Sandford Fawcett last Wednesday held an inquiry, on behalf of the Local Government Board, into an application by the Halifax Town Council for permission to borrow a sum of over £100,000 for various purposes. One of the items consisted of £28,000 for the electric lighting undertaking; and on this coming up for consideration, it was stated that a large portion of the money had already been spent. This drew from the Inspector the remark that the Council were getting a reputation at the Local Government Board of always anticipating loans. If this went on much longer, he was afraid there would be some very serious trouble about it. The Board had already written and warned the Council. It would be just as well to draw up an estimate of what would be required within the next twelve months or two years, and make application for it as soon as possible. In reply to a

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 151.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	12½—13½	..	5 11 1
200,000	5	Nov. 13	6½	Bombay, Ltd.	5⅞—6¼	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4½—4¾	..	5 9 5
380,000	Stk.	Aug. 14	12	Brentford Consolidated	247—252	..	4 15 3
270,000	,,	,,	9	Do. New	182—187	+2	4 16 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	156—141	+2	3 10 11
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	110—113	..	3 10 10
220,000	Stk.	Sept. 11	10⅝	Brighton & Hove Orig.	209—214	+2	5 0 4
246,320	,,	,,	7⅛	Do. A. Ord. Stk.	155—160	+3	4 16 11
460,000	20	Sept. 26	10	British.	39½—40½	..	4 18 9
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c.	—	..	—
82,850	10	,,	9	Do. 7 p.c.	—	..	—
500,000	10	Oct 15	7	Buenos Ayres (New) Ltd.	10⅛—10⅜	..	6 10 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
150,000	20	July 11	8½	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
550,000	Stk.	Oct. 15	12½	Commercial Old Stock	—	..	—
251,875	,,	,,	9½	Do. New do.	—	..	—
271,875	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	—	..	—
800,000	Stk.	Dec. 11	8	Continental Union, Ltd.	133—138	..	5 15 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	141—145	..	4 16 7
575,000	Stk.	Aug. 28	5⅛	Crystal Palace Ord. 5 p.c.	117—122	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
106,158	,,	Jan. 15	5	Do. 5 p.c. Deb. Stk.	137—140*	..	3 11 5
486,090	10	July 30	10½	European, Ltd.	18—19	..	5 10 6
354,060	10	,,	10⅝	Do. £7 10s. paid	13½—14½	..	5 8 8
15,243,200	Stk.	Aug. 14	4	Gas-light and Coke Ord.	86—88	..	4 10 11
2,600,000	,,	,,	3½	Do. 3½ p.c. max.	86—88	..	3 9 7
3,799,735	,,	,,	4	Do. 4 p.c. Con. Pref.	110—112	..	3 11 5
4,193,975	,,	Dec. 11	3	Do. 3 p.c. Con. Deb.	92—94	..	3 3 10
2,2,500	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Oct. 30	8	Hongkong & China, Ltd.	14½—15½	..	5 3 3
3,800,000	Stk.	Nov. 13	10	Imperial Continental	205—208	+2	4 16 2
473,600	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.	99—101	..	3 9 4
158,242	Stk.	Aug. 25	6	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0
561,000	Stk.	Aug. 28	10	Liverpool United A	224—226	..	4 8 6
718,100	,,	,,	7	Do. do. B	165—167	..	4 3 10
306,083	,,	Dec. 31	4	Do. do. Deb. Stk.	114—116	..	3 9 0
75,000	5	Dec. 11	5	Malta & Medn., Ltd.	4—4½	..	5 11 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	104—108	..	4 12 7
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 13	3½	Monte Video, Ltd.	9—10	..	7 0 0
1,515,892	Stk.	Aug 8	4½	Newc'tle & G'tesh'd Con.	104—105	..	4 5 9
346,855	Stk.	Jan. 2	3½	Do. 3½ p.c. Deb.	97—98	..	3 11 5
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	143—148	+3	5 8 1
60,000	5	Sept. 26	7	Ottoman, Ltd.	6½—7	..	5 0 0
					* Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
105,005	Stk.	Jan. 15	6⅛	Ply'mth & St'house 5 p.c	123—128*	+1	4 15 9
851,070	10	Oct. 15	7	River Plate Ord.	10¼—10⅜	..	6 10 3
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
250,000	10	Sept. 26	8	San Paulo, Ltd.	11½—12½	..	6 8 0
135,000	Stk.	Sept. 11	10	Sheffield A	236—238	..	4 4 0
209,984	,,	,,	10	Do. B	233—235	..	4 5 1
523,498	,,	,,	10	Do. C	233—235	..	4 5 1
103,235	Stk.	Sept. 26	5	Shrewsbury Ord, 5 p.c.	113—116	..	4 6 2
6,000,000	Stk.	Aug. 14	5½	South Met., 4 p.c. Ord.	122—124	+½	4 6 0
1,700,000	,,	Jan. 15	3	Do. 3 p.c. Deb.	91—93*	..	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord.	103—107	..	4 13 6
87,950	,,	Jan. 15	4	Do. 4 p.c. Deb.	100—103*	..	3 17 8
120,000	Stk.	Aug. 28	6	Tottenham and Edmonton A. 5 p.c.	118—123	..	4 17 7
300,520	,,	,,	4½	Edmonton B. 3½ p.c.	93—96	..	4 13 9
182,380	10	Dec. 30	5	Tuscan, Ltd.	8½—9½	..	5 5 3
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	94—96	..	5 4 2
230,000	5	Aug. 14	5½	West Ham, 10 p.c.	—	..	—
172,000	10	,,	6½	Do. 7 p.c.	—	..	—
				WATER COMPANIES.			
780,662	Stk.	Dec. 30	11½	Chelsea, Ord.	315—325	..	3 10 9
150,000	,,	,,	5	Do. 5 p.c. Pref.	150—155	..	3 4 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Sept. 26	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Oct. 15	8	East London, Ord.	230—235	..	3 8 1
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	142—147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb.	97—99	..	3 0 7
700,000	50	Dec. 11	8	Grand Junction 10 p.c. max.	115—120	..	3 6 8
310,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
708,000	Stk.	Aug. 14	14	Kent	305—315	..	4 8 11
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—210	..	3 6 8
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	305—315	..	3 9 10
406,200	100	,,	8½	Do. 7½ p.c. max.	220—230	..	3 13 11
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
500,000	100	Aug. 14	12⅝	New River, New Shares	395—405	..	3 3 2
1,000,000	Stk.	July 30	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,300	Stk.	Dec. 11	7	South-wark and Vauxhall Ord.	208—213	..	3 5 9
126 500	100	,,	7	7½ p.c. max.	200—210	..	3 6 8
489,200	Stk.	,,	5	5 p.c. Pref.	151—154	..	3 4 11
1,019,585	,,	Oct. 15	4	4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 11	10	West Middlesex.	295—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb.	97—99	..	3 0 7
					* Ex. div.		

question as to how long the estimate in the present application in connection with the Electric Lighting Department would tide them over, it was stated that it was originally made for works that would be required between last March and March of the present year. This was why so much of the works had to be already carried out. The engines and boilers, it was stated, would take them over next winter's load.

Dr. Kennedy to Report at Manchester.

The Electricity Committee of the Manchester City Council have received intimation that a Sub-Committee have been to London and interviewed Dr. Kennedy on the subject of Mr. Metzger's report on the demand for the current and the plant available in the three generating stations, together with the criticisms and strictures which have been written upon it by a member of the Committee. A month ago the Committee learned that Dr. Kennedy had declined to undertake any duties in connection with the subject; but he has now been induced to review his position, and will undertake the consideration, not only of the documents referred to, but of all matters affecting the whole condition of the department. This announcement has been received with approval by the Committee, as indicating a course which will be likely to prove satisfactory to the Council and to the public generally. The Committee's former resolution to reduce the price of current, for motive purposes only, has been ratified. It is intended, as intimated at the last meeting of the City Council, to lower the price of the class of current specified from 1⅜d. to 1¼d. per unit. In connection with this matter, it has been further decided to approach the Council once more with a recommendation that powers be asked to borrow £10,000 wherewith to purchase motors which the department may let out on hire.

A Tangle at Tiverton.

The Tiverton Town Council found themselves in a pretty fix yesterday week over the electric lighting scheme. Having previously decided upon a municipal installation, the Council met to reconsider the position at the bidding of a meeting of ratepayers, who had pronounced emphatically against municipalization, and just as emphatically in favour of a sort of partnership scheme put forward by the firm of Messrs. Christy Bros. But the Council were still reluctant to give way to the expression of public opinion which they had invited; and, if not bent upon carrying out their own scheme, they were at least uncertain whether they ought to adopt the one which the meeting of ratepayers approved. A motion that the Standing Orders should be suspended so as to rescind the resolution adopting the scheme put forward by the Surveyor, and instead thereof to approve that of Messrs. Christy, was promptly met by an amendment to the effect that the latter should not be adopted. On a vote being taken, the motion was defeated by a majority of 14 to 9. Some of the members then wished to propose that an offer made by Messrs. Crompton and Co. should be accepted; but they found themselves stopped by the fact that a proposal for suspending the Standing Orders and rescinding the previous resolution had been already defeated. The Council tried in vain to get over this difficulty, much to the amusement of their constituents, who filled the space set apart for the public, and greatly enjoyed the spectacle. After about three hours had been spent in this way, the Council adjourned for a week, in order that opportunity might be found for considering what should be done next.

Erith Abandons Oil for Electric Lighting.

Readers of the "JOURNAL" may remember that a good deal of fun was made in its columns a few years ago over the performance of what were called the "smoky doubtfuls"—in other words, the oil-lamps—used in the public lighting of Erith. Possibly becoming dissatisfied with this somewhat primitive system of street illumination, the Urban District Council decided—notwithstanding the opposition of the Ratepayers' Association, and an offer by a local firm to supply current at 3d. per unit for street lighting—on having an electric light station of their own, for which they succeeded, though not without difficulty, in obtaining a loan of £23,506. The works were thereupon commenced; and the scheme was brought to completion on Monday night last week, when the town was lighted for the first time by electricity. The incandescent lighting is done with Nernst lamps of quarter and half ampere power; and for the most part they are placed in the existing lanterns, which have been provided with suitable reflectors. In addition to the incandescent lamps, there are 17 arc lamps. At the base of each pillar there is a door giving access to an economy coil, resistances, and switches. The lengths of cable used are approximately as follows: On the high tension feeders, some nine miles; for the low tension network, 5½ miles; and on the street lighting, about 24 miles—making a total length of cable through which current is supplied of 38½ miles. The Council were very jubilant at the opening ceremony, at which the Chairman (Mr. A. Vinson, J.P.) presided, having among the guests Sir William Hart Dyke, Bart., who represents Dartford in Parliament. They take credit for being the pioneers in this country of the three-phase high-pressure alternating current supply system with low-pressure distribution, the advantage claimed for which is the possibility of using high pressure and keeping down the size of the main cables.

The Lighting Question at Kingstown.

At the meeting of the Kingstown District Council last Tuesday, an attempt was made by Mr. Coldwell to obtain a vote sanctioning the carrying out of a scheme of electric lighting in accordance with a report presented by Mr. Manville on Aug. 22, 1896. The Electric Lighting Committee had decided to recommend to this effect to the Council; and Mr. Coldwell moved the confirmation of their resolution. He explained that the question first came forward in 1895, and it was then decided to apply to the Board of Trade for a Provisional Order for the lighting of the town. He submitted that as they were to have a destructor they should make a good job of the undertaking by carrying out a scheme for the whole township. The tenders received were for £47,000; but, allowing for contingencies, they estimated the work at £50,000. It had now come to be a question whether they were

SPIRAL GUIDED GASHOLDERS

WITH WALKER'S IMPROVED METHOD OF STRONG PLATING FOR ATTACHMENT OF GUIDES.

GASHOLDERS WITH GUIDE-FRAMING.

STEEL TANKS.

FOR FULL PARTICULARS WRITE TO

C. & W. WALKER, Ltd.,

Midland Iron-Works: DONNINGTON, NEWPORT, SALOP.

London Office: 110, CANNON STREET, E.C.

to drop the electric light or not. If they supplied it at 5d. per unit, it was at the rate of 2s. 6d. per 1000 cubic feet for gas. It was important for the township to consider the question, as it vitally affected its welfare. If the inhabitants wanted electric lighting and did not get it, they would go elsewhere. Last year a sum of £1200 was lost owing to vacant houses; and this meant that somebody would have to pay the rates for them. He contended that there was no difficulty in the way of the very poor in Kingstown having the electric light in their houses. They were paying £1400 or £1500 a year for gas, and were only like yearly tenants. If they had an electric light station, they would, after a time, be able to hand it over free of cost, representing an enormous saving and addition to the revenue of the township. Mr. M'Cullagh seconded the motion. Mr. Barrett said he was consistently opposed to the use of electricity for public lighting, because they found that in Pembroke and Bray it was a miserable failure. He contended that gas was best and cheapest. Gas at 3s. per 1000 cubic feet would amount to only £1 5s., whereas electricity at 6d. per unit would, for the same purpose, come to £16 17s. 6d. If they got a company to take all the risks, he would not oppose; and they could sell the Provisional Order, and get back their £2000. They would have to spend £47,000 on the lighting of the township by electricity. If they adopted the scheme recommended by the Gas Company, of putting in new lamps at a cost of £2000, repayable in ten years, he submitted that it would be the best course. Mr. M'Cormack also opposed. He said the Bray electric light station was working at a heavy loss. It was proved at a Local Government Board inquiry that Rathmines lost £2000 for the first year on the electric works. Mr. Kennedy moved, as an amendment, that the matter be postponed until the Council had either accepted or rejected the proposals of the Gas Company. Mr. Barrett seconded the amendment; and it was carried by ten votes to three.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Corporation of Greenock have, I anticipate, effectually settled one of the bogeys which have been disturbing their nervous system for the past six months. The trouble, when diagnosed, showed an alarming loss of mental vision as the chief symptom. The Manager (Mr. W. Ewing) had been able to produce results which had not been before achieved in Greenock; but when these were reported, it somehow did not follow that the Commissioners were satisfied. The coal which had been used had not been correctly stated, it was argued; and therefore the whole fabric of the Manager's report was mythical. The ailment could have been treated at the time; and had it been so, it would doubtless have given way before the treatment, because, if the Gas Committee had gone to the works, they could have looked around, and, with the help of a few workmen, they could have satisfied themselves as to the quantity of coal in stock. But the paralyzing spell of mental aberration was over them, and they listened to the suggestion of Mr. T. Mitchell, who seemed to be the greatest sufferer, and appointed a Committee to inquire into the matter of the coal, and to report to the Gas Committee. A meeting of this Special Committee was held on Dec. 1. Mr. Mitchell proposed that the Master of Works should be asked to measure the stock of coal at the gas-works; but the Committee resolved to call in the services of a neutral person. Mr. Ewing concurred in the proposal to have a measurement taken; and the Committee asked Mr. W. Foulis, of Glasgow, to nominate a measurer. Mr. Foulis submitted the name of the firm of M'Greaths and Stevenson, civil and mining engineers, of Glasgow. This firm having accepted the engagement, the examination took place on Dec. 10. The report of the measurers was to the effect that, owing to the mixing of the different varieties of coal—due, presumably, to the alterations upon the retort-house—the respective proportions might not be quite correct; but they considered that the error (if any) would be so trifling as not to be worth considering. The stock they reported to be—

	Cubic Feet.	Tons.
Cannel	20,601 ..	484
Soft coal	44,060 ..	1074
Nuts	9,825 ..	218
Shale	7,220 ..	176
Total		1952

The Committee reported to the Gas Committee that, in view of the various questions raised, they had incurred the expense of having the coal in stock measured; and they gave the result. They also submitted a statement by the Manager of the coal received and carbonized from June 30 to Dec. 10, with a report by the Auditor which certified that the coal in stock at June 30, as per stock-book, was—

	Tons.
At works	2,456
At station	227
Total	2,683
Received from June 30 to Dec. 10	11,888
	14,571
Deduct coal carbonized from June 30 to Dec. 10	12,892
Stock at December 10, as per books	1,679

Therefore the coal actually in stock on Dec. 10, as measured by the experts, exceeded the quantity stated in the books, as certified by the Auditor, by 273 tons. In view of these certificates, the Committee felt satisfied that the quantity of coal in stock on June 30, as stated in the stock-book, might be taken as having been there at that date.

This report was submitted to the Gas Committee last Tuesday, and was agreed to. The Corporation are to meet next week to consider it.

JOHN WRIGHT & Co.,
Essex Works,
Birmingham.

1903

"EUREKA"

Gas-Fires.

JOHN WRIGHT & Co.
Essex Works,
Birmingham.

The Special Committee adopted a somewhat expensive method of dealing with the trouble; but if they have succeeded in eradicating it, the money will not be ill-spent. It may be that the report will not remove the film from the eyes of all, and that we may find attempts to get behind it; but this will, to most people, indicate, not that the gas undertaking is in a bad way, but only the deep-seated nature of the affection from which some of the doubters have been suffering. I shall await the discussion in the Council next week with some anxiety, as I am desirous of seeing how far the cure adopted by the Special Committee has been effectual.

At the meeting of the Dunfermline Town Council this week, a letter from the Clerk to the County Council was read, in which attention was directed to the report of the County Medical Officer of Health upon the alleged pollution of the Tower Burn and other streams, by the discharge from the gas-works of a thick, dark, strongly-smelling compound of tar, ammonia, and sulphur compounds. Bailie Harley rather testily remarked that the Council did not require to have their attention directed to the matter by the County Council, as it was being looked to by the Manager and himself. An analysis of the gas washings had been made; and proposals were under consideration which would, it was hoped, remove every cause of complaint. The Commissioners then entered upon a long discussion on a motion by Mr. Dick to the effect that the Manager be instructed to report monthly as to the candle power of the gas supplied to the public. Though the motion was merely for a monthly report, it seemed to be understood that the question raised was whether or not the illuminating power of the gas should be reduced. Bailie Harley, the Convener of the Gas Committee, quoted Sir George Livesey's remarks at the Glasgow Congress upon the imminence of lower quality gas, and asked whether they, at this time of day, were to go in another direction from the leaders in the scientific world, and disregard the utterances of authorities. In support of the motion, Mr. Robertson quoted statistics with regard to illuminating power in other places, and brought out that in the nine largest towns in Scotland the average illuminating power of the gas is nearly 23 candles. In Dunfermline, it is about 21 candles. The same speaker mentioned the most interesting item in the discussion, when he said that since their previous meeting he had sent for a plumber to examine the gas-fittings in his house, and that the plumber removed a deposit which had been obstructing the supply of gas. This deposit Mr. Robertson attributed to the use of oil—benzol—for enrichment; but this was a view which Bailie Harley stoutly disputed, asserting that it was quite contrary to fact, because oil removed the deposit. It was in spite of the oil that there was a deposit. When asked, however, if the deposit was due to the use of a low quality of coal, Bailie Harley declined to say. It was, he said, the splint coal which made the deposit; and the benzol removed it, but not effectually. The name of this "deposit" was not given; but I have heard of the recent appearance of naphthalene in Dunfermline, which is causing some trouble. When that is known, there need be no wonder that now and again there are grumblers at the quality of the gas. Mr. Waddell is not easily daunted; and it may be taken for granted that he will not rest satisfied till he has got the intruder expelled. It may be that the appearance of this troublesome visitor is due to the change in the character of coal in Fife. The coal workings are now going farther down than before; and it is believed to be due to this circumstance that fire-damp has begun to be met with, which has been hitherto almost unknown in Scotland. This shows a change in the character of the coal, and is worth noting. In the discussion, as in this paragraph, the original purpose was all but forgotten. In the end, however, it was agreed that the Manager should make a report monthly as to the approximate, not the accurate, illuminating power of the gas.

The Dunbar Gas Commissioners are contemplating the expenditure of about £2000 upon extensions at the burgh gas-works, of which nearly one-half will be required for improvements in the mains.

In the Town Council of Dumfries, Mr. Thomson is the member who is most difficult to convince as to the necessity for outlays upon the gas-works. When it was apparent to everyone else that a new gasholder was an absolute necessity, Mr. Thomson, as he says himself, struggled against the proposal. He was obliged to give way in the end; and the holder is being erected. Mr. Thomson's anxiety now is as to the working expenses in the gas-works; and he is in process of endeavouring to get the Corporation to agree to the issue of a circular to towns of similar size to Dumfries, asking information as to the working expenses, the price of gas, and the charges for interest and repayment of loans. The Gas Committee agreed to the proposal, and recommended it to the Town Council; but I rather think it was one of the subjects that were referred back to the Committee, in which case it will be at least a month before the circular can be issued. What the object is in seeking the information is not disclosed; but it may be taken as almost a certainty that it is not with a view to increasing the outlay, and that the intention is the other way. As to that, the circumstances are not alike in any two places; and, therefore, lest unreasonable conclusions should be based upon the return, the better way to deal with the circular, should it ever be issued, would be to take no notice of it.

An action has been disposed of before Lord Stormonth-Darling in the Court of Session, at the instance of John Bruce, crofter, at Aird, in Sleat, Skye, against Mrs. Macfarlane, widow, residing at 21, Kingsborough Gardens, Glasgow, in which £250 was sued for as damages for the death of the pursuer's daughter. The girl was a domestic servant in the employment of the defender; and it was stated that on the night of July 18 last, when she went to bed, she hung a print wrapper upon a piece of projecting gas-pipe. The weight of the garment was believed to have caused the pipe to bend and crack, allowing the gas to escape; and in the morning the girl was found in bed in an unconscious condition. She was taken to the Western Infirmary, where she died on July 21, from the effects of gas poisoning. It was averred that the girl was quite unaccustomed to lighting by gas while at home; and having been only six months in service in a house where gas was used, she was inexperienced in such matters. It was maintained that it was the duty of the defender to have had the projecting gas-pipe removed,

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000

	Cubic Feet Daily.
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000
PERNAMBUCO (Brazil)	125,000
MALTON	150,000
DULUTH, MINN. (Second Contract)	300,000
BROCKVILLE (ONT.)	250,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 Cub. Ft. SMETHWICK, 500,000 Cub. Ft. LEICESTER (2nd Cont.), 1,000,000 Cub. Ft.
GRAVESEND, 300,000 C. Ft. NEWPORT, MON. (2nd Cont.), 250,000 C. Ft. TORONTO (3rd Cont.), 750,000 C. Ft.

or covered over and rendered safe, because it was an obvious source of danger—the position and appearance of the pipe indicating to an inexperienced person that it was designed to be used as a clothes-peg. In defence, it was said that the pipe was not dangerous to anyone who used ordinary care. The girl was quite well aware that the pipe was a gas-pipe, and not a clothes-peg, and she did not require to use it as such. Further, it was stated that the girl was warned by a fellow-servant not to use it for hanging clothes upon. A number of articles, it was believed, were hung upon the pipe. This, it was maintained, was done culpably and recklessly; and it was pleaded that the accident was caused solely, or at least was materially contributed to, by the girl herself. Lord Stormonth-Darling, after hearing Counsel upon the relevancy of the action, stated his opinion to be that, if the girl had been a person of ordinary intelligence, it was impossible to suggest, on the statement of the pursuer, that she would have been justified in using a piece of gas-pipe as a clothes-peg; and this being the whole ground of action, it seemed to him to be entirely irrelevant. He therefore dismissed the action, and found the pursuer liable in expenses.

The Garw and Ogmore Gas Company.—The business of the Garw and Ogmore Gas Company is growing at a rate which must be gratifying to all connected with the concern. During the past twelve months, the increased sale has been 49·4 per cent.; the increased consumption over two years ago being 119 per cent. To cope with such a rapid increase, the Directors decided to remodel the works; and plans were prepared by the Manager (Mr. R. B. Silcox) for a new bench of retorts, annular condensers, purifiers and house, and increased storage, thus doubling the capacity of the works. The whole of the extensions were supplied and fixed by Messrs. E. Cockey and Sons, of Frome. During the two years that Mr. Silcox has been Manager, the whole of the public lamps in the district have been converted from oil to incandescent gas; while the number of consumers has increased from 178 to 542. At the same time the leakage has been brought down from 19·6 to 12·2 per cent.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, by order of the Directors, £5000 of ordinary stock of the Guildford Gas Company, carrying 5 per cent. dividend, at £106, £107, and £108 per £100 of stock. On the same occasion, he placed a new issue of £5000 of "D" gas stock of the Barnet District Gas and Water Company, ranking for a dividend of 7 per cent., but the last having been at the rate of £4 18s. per cent. per annum, at £104 and £105 per £100 of stock. Some original stock of the Brighton and Hove Gas Company was sold at £220, and some of the "A" ordinary stock at £160, per £100. At Derby, on Thursday, £5500 of new ordinary stock of the Derby Gas Company, entitled to a dividend not exceeding 5 per cent., was sold in lots of £100 each, and the majority realized a premium of £21 10s. The demand, however, was so great that the last lots were placed at £22 premium. The Directors of the Company were individually considerable purchasers.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 17.

Sulphate of Ammonia.

On the east coast the demand has been well sustained, and prices have hardened slightly; but on the west coast supplies have been more abundant, and there has been no improvement in values. The closing quotations are £12 3s. 9d. per ton f.o.b. Hull, £12 5s. per ton f.o.b. Liverpool, and £12 6s. 3d. per ton f.o.b. Leith. Excepting for the Colonies, direct demand has eased off, no doubt owing to severe weather, and the buying has consequently been for the most part for covering January contracts. Makers are still firm at £12 7s. 6d. per ton, ordinary terms, f.o.b. Leith, and also Beckton terms, London, for delivery over the spring months; but 2s. 6d. per ton less would be accepted for summer and autumn delivery.

Nitrate of Soda.

This is unchanged in the forward position, but is rather firmer on spot; the quotations being 9s. 1½d. per cwt. for ordinary, and 9s. 3d. for refined quality.

LONDON, *Jan.* 17.

Tar Products.

The markets remain in about the same position, and, with the exception of pitch, there is not very much doing. The request for this article continues very strong; and there are reports of a large business having been done over next year. The demand from South Wales, however, is not so strong, doubtless owing to the fear of labour troubles. Crude carbolic continues in the same position; but there is more offering for prompt delivery, and 1s. 6½d. has been accepted for immediate shipment at out ports. In crystals, the prices remain unchanged; but several large makers appear to be fully sold for early delivery. It is therefore difficult to understand why values do not improve. In creosote, there has been a fairly good demand for export; and one of the large railway contracts has been decided, for delivery on the east coast, at a very good price. As regards benzol, there is more 90 per cent. offering for prompt delivery; but makers decline to sell forward at 10d., although this price would be accepted for January only. In 50-90 per cent., there are inquiries for delivery all over the present year; but makers decline to quote. Solvent, toluol, and anthracene remain in the same position.

The average values during the week were: Tar, 22s. 6d. to 27s. Pitch, London, 58s. 6d. to 60s.; east coast, 56s. to 57s.; west coast, 55s. to 56s. Benzol, 90 per cent., 10d.; 50-90 per cent., 8d. to 8¾d. Toluol, 7¾d. to 8d. Crude naphtha, 3¾d.; solvent naphtha, 8½d. to 9¾d.; heavy naphtha, 9d. to 10d. Creosote, London, 1⅜d.; North, 1⅜d to 1½d. Heavy oils, 2d. to 2¼d. Carbolic acid, 60 per cent., 1s. 6½d. to 1s. 7d. Naphthalene, 35s. to 55s.; salts, 25s. to 27s. 6d Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, 1d. nominal.

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER **100** MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Southport, Alloa, Broughty Ferry, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Seven Years.

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

Sulphate of Ammonia.

The market is very firm; and a large business has been done for delivery over the next three months. The Gaslight and Coke Company have lately sold at £12 7s. 6d. for January-March, and do not appear anxious to place any further quantity at this figure. Another large gas company accepted £12 6s. 3d. for some quantity, for January shipment, but are now firm at £12 7s. 6d. In Leith, sales are reported at £12 7s. 6d. for prompt in more than one instance. Business has been done in Hull at £12 5s. and £12 6s. 3d., prompt shipment; and makers now ask £12 7s. 6d. for January-March. Liverpool prices are decidedly better, and makers ask £12 6s. 3d. to £12 7s. 6d.; but there is not much doing for prompt shipment.

COAL TRADE REPORTS.

Lancashire Coal Trade.

A moderately brisk demand is just now the general report throughout the coal trade of this district; but supplies continue fairly sufficient all through to meet requirements. Except, however, a hardening in prices where a short time back they were being cut low to effect clearances, there is no actual advance upon late rates. House-fire qualities are in tolerably active request, owing to the spell of severe weather, and collieries are kept on full time, with all that they are raising moving away. Prices are strong at about 15s. to 15s. 6d. per ton for best Wigan Arley, 13s. to 14s. for seconds Arley and Pemberton 4 feet, and about 10s. 6d. and 11s. up to 12s. for the commoner sorts of round coal at the pit mouth. Prices are firm at 4s. 6d. to 4s. 9d. for common slack, 5s. 6d. to 6s. for medium, and 6s. 6d. to 7s. for the better sorts. In the shipping trade, there has been a good deal of activity in consequence of fairly large inquiries for the United States; and prices have been stiffening. Steam coals delivered at the ports on the Mersey are quoted at 11s. to 11s. 6d. per ton, and slack 6s. to 7s. For all descriptions of coke, prices are strong at recent full rates.

Northern Coal Trade.

The strong demand for northern coals continues, and there is very little for sale for the next three weeks of the two classes that are at the present time most in request. There is still a good inquiry from the United States; and this gives full work to the collieries and helps to stiffen the price of many kinds of fuel. Best Northumbrian steam coals are firm at 11s. 6d. per ton f.o.b., second-class steams are 11s. to 11s. 3d., and steam smalls are rather scarce at 5s. 9d. In gas coal, the output is full; but it is well taken up—so much of it being needed for the long contracts, which still claim very heavy deliveries. For occasional cargoes, the quotation is from 9s 9d. to 10s. per ton f.o.b.; but the price under contract seems to be from 8s. 9d. to 9s., according to the length of the time of delivery. There have been American inquiries for gas coals; but so far no sale is known to have been made. Gas coke is rather irregular. It is, however, on the whole well taken up; and about 13s. 6d. per ton is the f.o.b. quotation on Tyneside.

Scotch Coal Trade.

Business is brisk, which is due to the probability of trouble with the miners in Wales, and to the scarcity of coal in America. Purchasers are now in a mood to contract forward, which has not been the case for some time. On account of the severity of the weather, there is a large demand for coal for domestic purposes, with the result that retail prices have been advanced 6d. per ton. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. to 10s. 9d., and splint 11s. to 11s. 3d. The shipments for the week amounted to 121,062 tons—an increase of 12,682 tons upon the preceding week, but a decrease of 6238 tons upon the corresponding week of last year. For the year to date, the total shipments have been 128,298 tons—a decrease of 26,549 tons upon the same period of last year.

Gas Workers in the Provinces.—According to the returns recently published, the number of persons enumerated at the census of 1901 as employed in gas-works in the administrative counties of Somerset, Monmouth, Suffolk, and Cornwall, totalled 374, 301, 262, and 102 respectively,

The Fatal Explosion at Strasburg.—We learn from Mr. F. W. Himing, the Secretary of the Continental Union Gas Company, that the Dalziel telegram on the above matter noticed in the "JOURNAL" last week referred to the acetylene works at the Strasburg Railway Station, and not to the gas-works of the Compagnie l'Union des Gaz.

Gorleston and Southtown Gas Bill.—The Yarmouth Town Council have authorized the Town Clerk to consult an expert in gas matters with regard to the Bill which is being promoted by the Gorleston and Southtown Gas Company, with a view to any amendments being made which may be considered necessary for the protection of the Corporation and the gas consumers. In the event of the negotiations with the Company not proving satisfactory, or not being concluded before the time for petitioning against the measure expires, the Clerk will lodge a petition against the Bill.

Gas and Water Profits at Chesterfield.—At last week's meeting of the Chesterfield Town Council, a letter was read from one of the members, Mr. Jacques, in which the writer, referring to the advantages which have accrued to the ratepayers from the trading departments of the Corporation, said that the figures relating to the gas and water concern, which was purchased in 1896, were very remarkable. It took the old Company seventy years to obtain 1228 customers for gas. In six years, the Corporation had increased this number to 4442. If the gas were now charged to the consumers at the Company's rate, they would have to pay £3800 per year more than they were now paying. Consumers were saving this sum per annum; they had paid per year £6912 in interest; they had wiped off per year £4299 of capital; and there had been a surplus of £2280 every year besides the large amount spent on extensions and charged to revenue.

SO GLAD!!!

This is my last season,

LITTLE'S PATENT

HOT COKE CARRIER

will be universally adopted in

1903.

Our Furnaces and Installations of Inclined Retorts have always been made a success, and our Patent Shot-pouch method of charging is the most Automatic System.

ADDRESS:

NEW CONVEYOR COMPANY, LIMITED,

SMETHWICK.

Westhoughton District Council and the Gas-Works.—At the last meeting of the Westhoughton District Council, it was resolved, on the motion of Mr. Coop, to communicate with the Gas Company to ascertain whether they would be willing to consider the question of selling their undertaking; and, if so, to suggest a meeting of representatives to meet the Company to discuss the subject.

German Coal for the Paris Gas Company.—In our "Coal Trade Reports" last week, reference was made by our correspondent in the North to the placing of a large contract with German collieries by the Paris Gas Company. It appears that the order was for 300,000 tons, to be supplied during the next three years, and that the prices asked were much below those submitted from Tyneside. The Germans are cutting into a business which has been held almost exclusively by the North for some years.

American Capitalists and the Paris Gas Supply.—It was announced in the "JOURNAL" a few weeks ago that Mr. G. O. Knapp, Mr. A. N. Brady, and Mr. C. K. G. Billings, the three responsible heads of the People's Gaslight Company of Chicago, had sailed for Europe in connection with a project for the formation of a "combine" to take over the gas supply of Paris. The "Financial News" says these gentlemen, associated with representatives of the Consolidated Gas Company of New York, are still hard at work on the business.

Prepayment Meter Gas Supply at Southport.—Cheaper gas at Southport has led to a readjustment of the charges for prepayment meters. Under the old arrangement, payment of 1d. entitled the consumer to 24 or 26 cubic feet of gas, according to whether or not the fittings were provided by the tenant. If two gas-brackets and a small grilling-stove were put in at the Corporation's expense, only 24 cubic feet were supplied. With cheaper gas, it has been decided to give 26 and 29 cubic feet respectively. In many instances, however, meters set for passing the larger quantity had not been readjusted; and in these cases a discount equal to 10 per cent., which is as nearly as possible equivalent to the difference in cubic feet, will be allowed to such consumers.

Gas-Works Extensions at Colwyn Bay.—The growth of the gas consumption at Colwyn Bay has become so great that it is at last necessary to double the producing plant at the gas-works, as well as to lay down long lengths of new mains. The Council therefore applied to the Local Government Board for leave to borrow £8210 for this purpose. Mr. R. H. Bicknell, who held a local inquiry into the matter last Tuesday, said that, seeing the rates of the town were so high, it would be necessary to convince the Board of the need for doubling the capacity of the gas-works. Mr. Bevan, the Chairman of the Council, replied that they would have to supply gas pumping-engines in connection with the new sewerage scheme. Besides this, additional attractive building estates were being opened out, and the demand for gas was increasing rapidly. Mr. Pennington, the Gas Manager, pointed out that the increase in the consumption last year over the preceding twelve months was 10¾ per cent.

Family Overcome by Gas at Swansea.—Last Thursday morning, Mrs. Wroe and her three children—two boys and a girl—residing at 213, Croft Street, Swansea, narrowly escaped asphyxiation by gas. It appears that the Corporation had been carrying out some sewerage work, and, owing to the trench opened not having been properly made good, the ground subsided, and caused a fracture of the pipe. The elder boy was the first to be affected; then the mother, who went to his assistance, was overcome. She, however, managed to call to some workmen in the street, who fetched a neighbour, to whose house the family were removed. A medical man was sent for; and all the sufferers gradually recovered. Curiously enough, the younger boy, not quite two years of age, was scarcely affected; and, fortunately, in no case has permanent injury been sustained.

Opposition to the Hexham Gas Bill.—A deputation waited on the Hexham Urban District Council at their last meeting for the purpose of urging the Council to oppose the Bill now being promoted by the Gas Company. The spokesman (Mr. E. Sisterson, J.P.) said he thought the time had gone by when the community should be exploited by a private Company. The present charge for 14-candle gas was 3s. per 1000 cubic feet; while in the Bill a standard price of 3s. 9d. was contemplated. The deputation were of opinion that the Company could supply good gas at 2s. 3d. per 1000 cubic feet, and still make a fair profit. Another point was that in 1881 the Company secured certain electrical powers which they never exercised; and under the present Bill there was no attempt to use them. The deputation suggested that the Council should get rid of these powers under the Act, and obtain power themselves, on behalf of the community, for electrical purposes. The Chairman (Alderman Stainthorpe), in reply, said it was the intention of the Council to oppose the Bill.

Incandescent Gas v. Electric Lighting for Machine-Shops.—Incandescent gas lighting on the Keith and Blackman high-pressure system has just been installed in Messrs. Glover and Sons' new machine-shop, for the manufacture of wheels, carts, &c., at Warwick. The shop is 150 feet long by 35 feet wide, and the whole of this large area is effectively illuminated by only eleven burners, each consuming 10 cubic feet of gas per hour, and giving an aggregate light of 3300 candles. The pressure-raiser is actuated by a belt from the shaft of the gas-engine used for working the numerous machines in the shop. Entire satisfaction has been expressed by the firm with the light, which is very steady, and with the illumination given by the lamps. The work was carried out by the Warwick Gas Company, whose Engineer is Mr. W. T. Tew, assisted by Mr. T. Greves, Messrs. Glover and Sons' Engineer. It may be mentioned that the firm have a portion of their works lighted by electricity; but they consider the new system far in advance of this, as the shop is much better lighted with the gas, and at less cost, and there are no shadows thrown on the work, as is the case with the electric light. Another advantage is that the shop can be lit without the engine running, when necessary, but, of course, not so brilliantly. This is very convenient in case of a few men working overtime.

BRADDOCK'S NEW PATENT

GAS STATION GOVERNOR

THE BEST GOVERNOR OBTAINABLE.

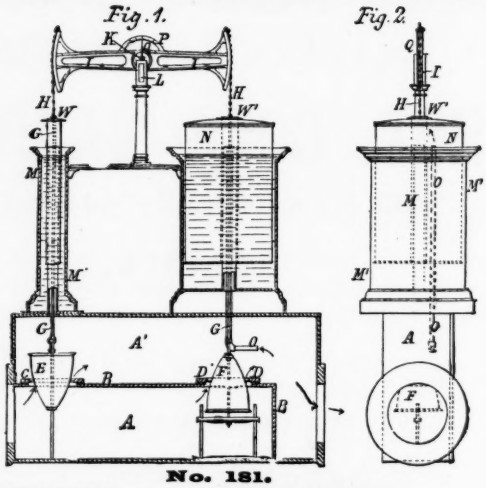
Most compact and convenient.

Unsurpassed for Durability,

Efficiency, and Reliability.

OVER 80 (4 in. to 36 in. inclusive) SUPPLIED.

Full Particulars, Illustrated Sheets, &c., free by post upon application.



WHEN THE GOVERNOR IS FITTED WITH

BRADDOCK'S PATENT "SELF-LOADING" APPARATUS

The outlet pressure is automatically and gradually varied, within any predetermined and fixed limits, according to the demand for gas being small or large.

First Cost soon saved. A proved success. Repeat Orders received.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), Globe Meter Works, **OLDHAM,**

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Telegrams: "BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

Extension at Staines.—Owing to the steady increase in the demand for gas, the Staines and Egham Gas Company have found it necessary to make considerable alterations and additions to their works. The Directors adopted the report of their Engineer, Mr. T. Webb, who recommended the pulling down and raising the walls of their No. 1 retort-house and adjoining coal-store, erecting a new roof and building a new stage-floor retort-bench, new annular condensers, foul-mains, and overhead railway, also a telescopic gasholder in a steel tank 110 feet diameter by 25 feet deep. Tenders were invited for the work; and the entire contract has been placed in the hands of Messrs. R. & J. Dempster, Limited, Manchester, including the whole of the brickwork and foundations. It is expected that all will be ready for making gas next September.

In connection with the Holborn to Strand improvement, the Improvements Committee of the London County Council have had under consideration accounts for £1099 6s. 6d. and £221 0s. 2d., sent in by the Gaslight and Coke Company and the New River Company respectively for the diversion of gas and water mains. The Committee think the charges made are reasonable; and they have given instructions for the accounts to be paid.

"Electric Traction on Street Tramways" is the title of a pamphlet just published by Mr. S. Edgecumbe Rogers, of Farringdon Street, E.C., as No. 9 of the Local Government Handy Series. It is a reprint of some articles by Mr. C. Biggs, Assoc.Inst.E.E., in the "Local Government Journal." Four chapters are devoted to a consideration of the various systems employed; and in the rest of the pamphlet the author deals with generating plant, steam piping, and car motors.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

SITUATIONS VACANT.

ANALYST. No. 3972.
CANVASSER (Incandescent Lighting). No. 3981.
DRAUGHTSMAN. Sheffield Gas Company. Jan. 31.
ENGINEER. Sheffield Water Department. Jan. 26.
FOREMAN. Canterbury Gas and Water Company.
FOREMAN (Purifying Department). No. 3973.
FOREMAN (Slot-Meter Installations). No. 3980.
GENERAL FOREMAN. No. 3970.

SITUATION WANTED.

TRAVELLER IN GAS STOVE TRADE. Howland, Faversham.

MEETING OF COMPANY.

SOUTH METROPOLITAN GAS COMPANY, Feb. 11.

PLANT, &c. (Second-Hand), FOR SALE.

CONDENSER. Redditch Gas-Works.
GASHOLDERS (2½ feet). No. 3979.
GOVERNOR (6-inch). Pontifex, London.
PURIFIERS AND CONNECTIONS. Wright, London.
PURIFIERS, SCRUBBER-WASHERS, GASHOLDERS, AND OTHER PLANT. Firth Blakeley, Dewsbury.
PURIFIERS, WASHER-SCRUBBER, &c. While and Son, London.
RETORT-BENCH FITTINGS. Sheffield Gas Company. Tenders by Jan. 31.
STATION GOVERNOR. Lancaster Gas Department.
STATION METER (30,000 cubic feet). Lancaster Gas Department.

PLANT, &c. (Second-Hand), WANTED.

METERS (DISUSED), BRASS, COPPER, LEAD ASHES, &c. Smith, Bradford.
PURIFIERS. Firth Blakeley, Dewsbury.

ROTARY WASHER-SCRUBBER (Manufacture on Royalty) No. 3982.

SALES OF STOCKS AND SHARES.

ALDERSHOT GAS AND WATER COMPANY. Jan. 27.
BRISTOL WATER COMPANY. Jan. 22.
HORNSEY GAS COMPANY. Feb. 19.
SHREWSBURY GAS COMPANY. Jan. 30.
TENDRING HUNDRED WATER COMPANY. Jan. 27.

TENDERS FOR

FIRE CLAY GOODS.

BIRKENHEAD GAS DEPARTMENT. Tenders by Jan. 29.
BLACKBURN GAS DEPARTMENT. Tenders by Jan. 24.

GASHOLDER.

HENLEY-IN-ARDEN GAS COMPANY. Tenders by Feb. 11.

PIPE LAYING AND JOINTING, &c.

EAST GRINSTEAD WATER DEPARTMENT. Tenders by Jan. 31.

PIPES AND CONNECTIONS, &c.

EAST GRINSTEAD WATER DEPARTMENT. Tenders by Jan. 31.
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by Feb. 9.

RETORT-BENCH AND IRONWORK.

OMAGH GAS COMPANY. Tenders by Jan. 21.

RETORTS.

BIRKENHEAD GAS DEPARTMENT. Tenders by Jan. 29.
BLACKBURN GAS DEPARTMENT. Tenders by Jan. 24.
OMAGH GAS COMPANY. Tenders by Jan. 21.

TANK FOR GASHOLDER.

HENLEY-IN-ARDEN GAS COMPANY. Tenders by Feb. 11.

TAR.

BOLTON GAS COMMITTEE. Tenders by April 1.

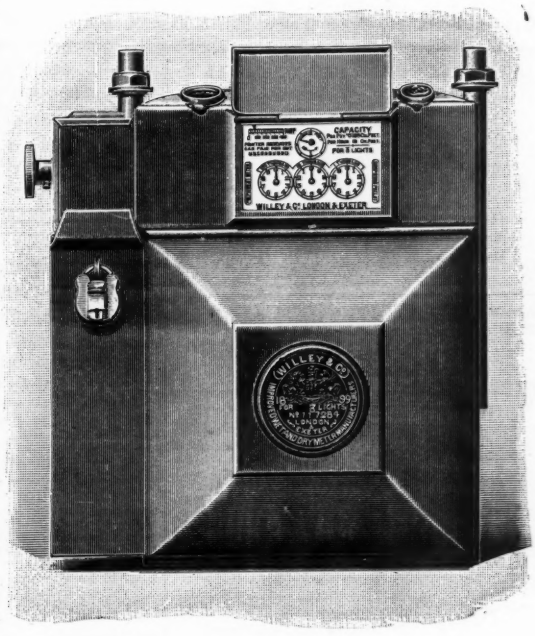
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LONDON AND EXETER.

The Torquay Town Council have applied to the Local Government Board for power to borrow £5000 for the further improvement of the gas-works in the St. Mary Church portion of the borough.

The Bolsover and District Water Company, Limited, has been registered with a capital of £10,000, in £1 shares, to supply the districts of Bolsover, Scarcliffe, and Palterton, or other districts in the United Kingdom, with water, and to carry out all necessary works.

Bray's "Economizer" burner No. 5 has been approved of by the Gas Committee of the Southport Corporation for use with their present low-power gas. The decision is the result of the instructions given to the Gas Engineer (Mr. John Booth) to test various burners and report thereon, as mentioned last week.

Alderman Harper, J.P., the senior partner in the firm of Messrs. John Harper and Co., Limited, of Willenhall, died on the 6th inst., in the 82nd year of his age. The deceased took a lively interest in the business, and was at his post up to Christmas Eve. The firm will continue under practically the same management that has existed for some years past.

The tenders invited by the New River Company a few weeks ago for £250,000 of debenture stock "D" were opened on Thursday. The applications ranged in price from £99 2s. 6d. to £97 (the minimum). Tenders at £97 3s. will receive about 94 per cent. of the amount applied for; those above this price being allotted in full. The average price obtained was £97 4s. 1d.

The Power-Gas Corporation, Limited, have secured a contract for a Mond gas installation for Messrs. J. & H. Robinson, Deptford Flour Mills, Greenwich. The plant will be capable of producing 1000-horse power with gas engines, the contract for which has been secured by Messrs. Mather and Platt, on behalf on the Korting Company.

We have received the "Colliery Manager's Pocket-Book" for the current year, published by the "Colliery Guardian" Company, Limited, of Essex Street, Strand. In addition to the ordinary almanac and diary, there is a large quantity of literary matter, selected and edited by Mr. R. A. S. Redmayne, M.Sc., M.I.M.E., &c., Professor of Mining in the University of Birmingham. It includes chapters on "Strength of Materials," "Machinery," "Electrical Engineering" (the last by Mr. T. Campbell Futers), and other subjects; and there is a map of British coalfields. This is the 34th year of publication.

At an extraordinary meeting, held towards the close of last month, the shareholders in the Company formed in Paris some few years ago for undertaking the lighting of towns and the manufacture of meters and other gas appliances (La Compagnie pour l'Eclairage des Villes et la Fabrication des Compteurs et Appareils divers) resolved to apply for judicial liquidation. The Directors presented a report to the effect that the Company had to face a loss of 8,071,197 frs. The realizable assets on the 15th of November last amounted to 48,756 frs. less than the liabilities which the Company were called upon to liquidate at once. On the same occasion, the report of a Committee of Inquiry into the general management of the concern was submitted.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year, 1903, are reminded that this can only be done during the current month.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

MR. S. J. HOWLAND, late with Messrs. John Wright and Eagle Range, Limited, desires position as TRAVELLER. Good References.
Address 55, Newton Road, FAVERSHAM.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telegrams: "LUMINOSITY."

DISTRICT Superintendent—No. 3971, "JOURNAL," Jan. 6. The Candidates for the Vacancy advertised under the foregoing number who have not received a reply by letter, are thanked for their Applications, and informed that they have not been successful.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered either on Fixed or Sliding-Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE Cement, Paints, Coals.

BALE AND CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHATE OF AMMONIA

SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

ANALYST wanted. Accustomed to making Tests of all kinds in a Gas-Works, including Photometry. Commencing Salary £120 per annum.
Apply, by letter, stating Age, Experience, References, &c., to No. 3972, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Directors of the Henley-in-Arden Gas Company invite TENDERS for the supply and erection of a new GASHOLDER and TANK, about 12,000 cubic feet capacity, with 6-inch Connections.
Tenders to be delivered not later than Feb. 11, to JOHN W. LORD, Secretary.

PURIFICATION.

WANTED, at a Gas-Works in the Midlands, a FOREMAN to supervise the Changing of the Purifiers.
For further Particulars, apply, by letter, stating Age, Experience, Salary required, and References, to No. 3973, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SHEFFIELD UNITED GASLIGHT COMPANY.

DRAUGHTSMAN.

WANTED, by the above Company, a thoroughly Experienced DRAUGHTSMAN, well up in constructional work, and accustomed to modern Gas-Works Plant.
Applications, which will be regarded as confidential, must state Age, Training, Experience, and Salary required, and be sent in addressed to the undersigned on or before Saturday, Jan. 31 inst.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Jan. 10, 1903.

PATENT "NEW" ROTARY WASHER-SCRUBBER.

PATENTEE desires to place this with a Manufacturer to supply on Royalty. Orders have already been received and executed.
Address, in First Instance, No. 3982, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a large Gas Company, a good CANVASSER, to push Incandescent Gas Lighting. Must have a knowledge of Electric Lighting.
Address No. 3981, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a good Outside FOREMAN, competent to superintend the Fixing of Slot Installations, including Fires and Cookers.
Apply, by letter, stating Age, Experience, and References, to No. 3980, **care of Mr. King, 11, Bolt Court,** FLEET STREET, E.C.

WANTED, by a large Gas Company in the South of England, a GENERAL FOREMAN, who must be used to work in connection with Inclined Retorts. Elevating and Conveying Machinery, the Manufacture of Sulphate of Ammonia, &c. He must be a thoroughly practical man, sober, steady, and thoroughly capable of taking entire charge of the Works in the absence of the Engineer. Wages £2 per week, with Cottage on the Works.
Apply, by letter, to No. 3970, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CANTERBURY GAS AND WATER COMPANY.

WANTED, at once, an active, reliable FOREMAN in the Gas Department. He will reside on the Works, and act under the directions of the Engineer.
Further Particulars and a Form of Application will be sent to Candidates on receipt of a stamped and directed Envelope.

By order,
JAMES BURCH,
Secretary.

Gas Offices, Castle Street,
Canterbury, Jan. 12, 1903.

CITY OF SHEFFIELD.
(WATER DEPARTMENT.)

DERWENT VALLEY WATER ACT, 1899.

THE City Council of Sheffield are about to proceed with the construction of a Tunnel for the purpose of conveying Water from the Works of the Derwent Valley Water Board at Lady Bower to the Works of the Sheffield Corporation in the Rivelin Valley—a total length of nearly Five Miles. The work to be designed and constructed under the charge and direction of an EXPERIENCED ENGINEER, who shall reside in the Rivelin Valley or neighbourhood, and devote the whole of his time to his duties under the Corporation, and who shall have daily personal charge of the work, and be responsible for it throughout, and shall do all special work in connection therewith which the Water Committee may desire, the Staff of Assistants, Inspectors, and others being provided by the Corporation, and under the direction of the Engineer.
The Engineer shall consult with the "Consulting Engineer" with regard to all Plans and Designs, and at every step during the progress of the Works, but without thereby lessening his own absolute responsibility, and he shall report direct to the Water Committee, from whom alone he will take direc ions.
The engagement to be until the completion of the above Works.
APPLICATIONS are hereby invited from COMPETENT ENGINEERS; it being indispensable that Candidates for the appointment should have had considerable experience both in the design and carrying out of similar Works under a Contractor or by administration under a Public Authority.
The application must state Age, Experience, present Position, Salary required, when at liberty, and contain *copies* of Testimonials, and furnish at least two References.
Personal Canvassing will be a disqualification.
Applications to be sent to me not later than Monday, Jan. 26, 1903, endorsed "Rivelin Engineer."

WILLIAM TERREY, General Manager.
Water-Works Office, Town Hall, Sheffield,
Jan. 3, 1903.

WANTED, old Disused Gas-Meters, BRASS, COPPER, and LEAD ASHES for Cash.
J. SMITH, Broker, Canal Road, BRADFORD.

TO BE SOLD—Purifiers, Two or Four, 10 feet square by 4 ft. 6 in. deep, planed Joints, Connections, and Overhead Girders.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

SECOND-HAND PLANT FOR SALE.

J. FIRTH BLAKELEY & CO., Dewsbury, Offer exceptional Bargains for immediate SALE as follows—
Four ANNULAR CONDENSERS, 32 in. by 22 in. by 22 ft. high.
TOWER SCRUBBERS, 3 ft. 6 in. by 30 ft. and 6 ft. by 30 ft high, &c.
Six 20 feet square PURIFIERS, 10 ft. and 12 ft. square. Several smaller Sets, including One Set of Four 5 feet square, and others suitable for Test Plants.
4-inch, 6-inch. 8-inch. and 12-inch STATION METERS and GOVERNORS.
GASHOLDERS, 12 ft. to 50 ft. diameter complete, and erected and guaranteed in perfect condition.
ENGINES and EXHAUSTERS, from 2000 to 60,000 cubic feet per hour.
LIVESEY WASHER, with 10-inch connections.
HOLMES PATENT WASHER-SCRUBBER.
CLAPHAM'S PATENT WASHER-SCRUBBER.
All overhauled, refitted, and guaranteed perfect. No reasonable offer refused.

PURIFIERS WANTED.

ONE Set of Four 14 feet, and One Set of Four 8 ft. Square PURIFIERS, VALVES, and CONNECTIONS complete. State Particulars and Price as they stand.
GAS COMPANIES having old Apparatus to DISPOSE OF, kindly communicate with J. FIRTH BLAKELEY & Co., DEWSBURY, who make a speciality of Buying and Selling SECOND-HAND APPARATUS.

FOR SALE—Two or Three 2½ feet GASHOLDERS.
Apply, by letter, to No. 3979, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A BARGAIN—Water-Cooled Condenser in perfect condition. Capacity 25,000 cubic feet per 24 Hours.
Address A. E. LAYTON, Gas-Works, REDDITCH.

SECOND-HAND 6-inch Governor for SALE. Practically new, and in very good condition.
Price to, and Particulars from, S. PONTIFEX AND CO., 17, Coleman Street, LONDON, E.C.

FOR SALE.

A 30,000 cubic feet per hour Station METER, with Hydraulic Valves, Bye-Pass, &c., complete, in splendid condition; Drum only a few years old. Also a 15-inch STATION GOVERNOR. Can give immediate delivery of Meter, and early delivery of Governor.
Offers to be sent to C. ARMITAGE, Corporation Gas-Works, LANCASTER.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Very good Gas Plant as under:—
PURIFIERS—Four, 12 feet square, with 8-inch Centre-Valve and Connections. Planed Joints.
Kirkham WASHER-SCRUBBER, 300,000 cubic feet per diem., with Engine and 8-inch Valves and Connections.
Livesey WASHER, 250,000 cubic feet per diem, with 8-inch Valves and Connections.
Photos. sent on application to SAML. WHILE AND SON 60, Queen Victoria Street, LONDON, E.C.

SHEFFIELD UNITED GASLIGHT COMPANY.

SECOND-HAND RETORT-BENCH FITTINGS.

THE Directors of the above Company have FOR SALE the HYDRAULIC MAINS, DIP-ARCH, ASCENSION, and STAND PIPES comprised in ten through Settings of 21 in. by 15 in. D-shape Retorts.
The whole of the Plant is at present at work, and in good condition.
Further Particulars may be obtained on application to the Engineer, Mr. J. W. Morrison, at the Company's Offices, Commercial Street.
Tenders, addressed to the undersigned, to be sent in not later than Saturday, Jan. 31, inst., endorsed "Second-hand Fittings."

HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Jan. 10, 1903.

COUNTY BOROUGH OF BLACKBURN.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for INCLINED RETORTS, FIRE-BRICKS, CLAY, &c.
Forms of Tender and Particulars of Requirements may be obtained from the undersigned, by whom Tenders must be received on or before the 24th inst., endorsed "Tender for Retorts," &c.

By order,
S. R. OGDEN,
Engineer and Manager.
Municipal Offices, Blackburn,
Jan. 5, 1903.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

1550 TONS OF 24-INCH CAST-IRON MAINS.

THE Gas Commissioners are prepared to receive TENDERS for the supply and delivery of about 1550 Tons of 24-inch diameter Cast-Iron Spigot and Faucet MAIN PIPES, in 12-feet lengths, along with CONNECTIONS and SPECIALS.
Contractors may also quote for Pipes to their own patterns, but not exceeding the specified weight.
Deliveries to be in regular weekly quantities as required, commencing at the end of March, and continuing up to the 30th day of September next.
The Pipes to be delivered on the North British or Caledonian Railway Systems, or free on rail at Leith or Granton Harbours.
Specifications, Schedules, and Forms of Tender may be obtained upon application to Mr. W. R. Herring, Chief Engineer and Manager, New Street Works Edinburgh.
Tenders to be lodged with the undersigned on or before Monday, the 9th day of February, 1903, not later than Ten a.m., endorsed "Tender for Main Pipes."
The Commissioners do not bind themselves to accept the lowest or any Offer, and reserve to themselves the right of accepting the whole or any portion of the material tendered for.

JAMES M'G. JACK,
Clerk to the Gas Commissioners.
25, Waterloo Place, Edinburgh.
Jan. 6, 1903.

OMAGH GAS COMPANY.

TENDERS are invited for the supply and erection of TWO OVENS of RETORTS on the Regenerative Principle complete, with all Bench and Retort Ironwork.
Particulars may be had from the undersigned, with whom Plans and Specifications are to be lodged on or before the 21st inst.
The lowest or any Tender not necessarily accepted.

JAS. BRODIE,
Manager and Secretary.
Gas Office, Omagh,
Jan. 3, 1903.

COUNTY BOROUGH OF BOLTON.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Gas and Lighting Committee of the Borough of Bolton invite TENDERS for the purchase of the TAR to be produced at their Works during a period of Three Years from the 1st of April next.
Further Particulars and Form of Tender may be obtained on application to Mr. William Walch, Office Superintendent, Gas Offices, Bolton.
Sealed Tenders, endorsed "Tender for Tar," and addressed to the Chairman, Gas and Lighting Committee, to be delivered at the Gas Offices, Bolton, not later than Thursday, the 22nd of January.

R. G. HINNELL,
Town Clerk.
Town Hall, Bolton,
Jan. 12, 1903.

TO RETORT AND FIRE-BRICK MANUFACTURERS.

THE Corporation of Birkenhead are pre- pared to receive TENDERS for RETORTS, BLOCKS, FIRE-BRICKS, FIRE-CLAY, &c., required at the Gas-Works during the current Twelve Months.
Forms of Tender may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.
Tenders, sealed and endorsed "Tender for Retorts, &c.," to be sent in to me not later than Five o'clock in the afternoon of Thursday, the 29th of January, 1903.
The person whose Tender may be accepted will be required to enter into a Contract containing a clause as to the payment of the rate of wages, and the observance of the hours of labour recognized and agreed upon between the Trades Unions and the Employers in the locality in which the work for carrying out the Contract is to be performed.
The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED GILL,
Town Clerk.
Town Hall, Birkenhead,
Jan. 17, 1903.

EAST GRINSTEAD RURAL DISTRICT COUNCIL.

WORTH AND WEST HOATHLY WATER SUPPLY.
CONTRACT No. 2.

THE Council are prepared to receive TENDERS for the supply of 3-inch, 4-inch, and 5-inch diameter CAST-IRON PIPES and SPECIAL CASTINGS, amounting in all to about 560 Tons.
Drawings can be seen, and copies of the Specification, with Schedule and Form of Tender, may be obtained at the Office of Messrs. Downes and Cornewall-Walker, Civil Engineers, 45, Warwick Road, Redhill, Surrey, on payment of a deposit of Two Guineas, which sum will, after the Council have come to a decision upon the Tenders, be returned to the Tenderer, provided that he shall have sent in a *bona-fide* Tender, and shall not have withdrawn the same, and shall have returned the documents lent to him for the purpose of making up his Tender.
Tenders, complete as bound, enclosed in a sealed envelope, endorsed as described in the Conditions of Tender, and addressed to the Council, must be delivered at the Office of the undersigned not later than Eleven o'clock on the morning of Saturday, the 31st day of January, 1903.
The Council do not bind themselves to accept the lowest or any Tender.

FRANCIS S. WHITE,
Clerk.
East Grinstead, Sussex.

EAST GRINSTEAD RURAL DISTRICT COUNCIL.

WORTH AND WEST HOATHLY WATER SUPPLY.
CONTRACT No. 3.

THE Council are prepared to receive TENDERS for the LAYING and JOINTING, &c., of 3-inch, 4-inch, and 5-inch diameter WATER-MAINS, about 13 miles in all, including Fixing Valves, Hydrants, &c., and the building of Brick Pits for same.
Drawings can be seen, and copies of the Specification, with Schedule and Form of Tender, may be obtained at the Office of Messrs. Downes & Cornewall-Walker, Civil Engineers, 45, Warwick Road, Redhill, Surrey, on payment of a deposit of Two Guineas, which sum will, after the Council have come to a decision upon the Tenders, be returned to the tenderer, provided that he shall have sent in a *bona-fide* Tender, and shall not have withdrawn the same, and shall have returned the documents lent to him for the purpose of making up his Tender.
Tenders, complete as bound, enclosed in a sealed envelope, endorsed as described in the Conditions of Tender, and addressed to the Council, must be delivered at the Office of the undersigned not later than Eleven o'clock on the morning of Saturday, the 31st day of January, 1903.
The Council do not bind themselves to accept the lowest or any Tender.

FRANCIS S. WHITE,
Clerk.
East Grinstead, Sussex.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, in the City of London, on Wednesday, the 11th day of February next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half-Year ended the 31st of December last, to declare a Dividend for the same period, and to elect Two Directors and One Auditor in the place of those retiring by rotation.

The TRANSFER BOOKS WILL BE CLOSED from the 28th day of January until after the Meeting.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road, S.E.,
Jan. 17, 1903.

SHREWSBURY GASLIGHT COMPANY.

DESIRABLE INVESTMENT.

THE Directors of the above Company invite TENDERS for sufficient SHREWSBURY GAS CONVERTED ORDINARY STOCK to produce the sum of £14,176.

This Stock is entitled to a Standard Dividend of 5 per cent., payable half-yearly, and the Maximum Dividend has been paid for many Years.

January 30, 1903, is the last day for reception of Tenders.

Forms of Tender may be had on application to LLOYDS BANK, LIMITED, SHREWSBURY, or to the Company's Secretary, from whom any further Information can be obtained.

By order of the Directors,
WM. BELTON,
Secretary.

Gas-Works, Shrewsbury,
Dec. 18, 1902.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the Hornsey Gas Company offer FOR SALE, BY TENDER, £5000 FIVE PER CENT. PREFERENCE STOCK and £5000 CONSOLIDATED STOCK, being a portion of £50,000 Additional Capital authorized to be raised under the "Hornsey Gas Order, 1902;" and they will be prepared to receive sealed Tenders for the Preference Stock and the Consolidated Stock not later than Twelve o'clock noon on Thursday, the 19th of February, 1903.

The amount of the Stock allotted must be paid up in full on or before the 28th of February, 1903, after which date Interest will commence to accrue.

The Interest on the Stock will be calculated Half Yearly to the 31st of December and 30th of June in each Year, and be paid by Warrants issued immediately after the Half-Yearly Meetings of the Company—usually in March and August respectively in each Year.

No deposit is required upon tendering.

Any amount, not being less than £10 or a multiple thereof, may be tendered for; and the Stock will be registered in the Company's Books in the names of the allottees or their nominees free of expense.

The minimum price, below which no Tender will be accepted, has been fixed in the case of the £5 per Cent. Preference Stock at One Hundred and Fourteen Pounds (£114) for each One Hundred Pounds of Stock, and in the case of the Consolidated Stock at One Hundred and Eighty Pounds (£180) for each One Hundred Pounds of Stock.

£100 of £5 per Cent. Preference Stock purchased at £114 will yield to the investor £4 7s. 9d. per cent. per annum.

The last dividend declared on the Consolidated Stock was at the rate of 9½ per cent. per annum. £100 of the Stock purchased at £180 will yield to the investor at the rate of dividend referred to £5 2s. 9d. per cent. per annum.

Particulars and Conditions of Sale, with printed Form of Tender attached thereto (upon which form only tenders will be received), may be obtained at the Company's Offices, No. 63, Chancery Lane, W.C., between the hours of Ten o'clock a.m. and Four o'clock p.m. Saturdays Ten a.m. to One p.m.

By order,
WILLIAM E. ROBERTS,
Secretary.

Hornsey Gas Company's Offices,
63, Chancery Lane, London, W.C.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

TENDRING HUNDRED WATER-WORKS COMPANY.

(Incorporated in 1884) supplying HARWICH, PARKESTON, and the East Coast Resorts of DOVERCOURT, WALTON-ON-NAZE, and FRINTON-ON-SEA, &c.

SALE BY AUCTION OF 500 £10 "A" SHARES, RANKING UP TO 8 PER CENT. DIVIDEND equally with the existing "A" Shares, which have received 4½ PER CENT. FOR THE LAST SIX YEARS.

The Water Revenue has risen from £3900 in 1897 to £6638 at the present time; and this New Capital is required for Works necessitated by the increasing demand for Water, the result of the continued development of the District.

MR. ALFRED RICHARDS will issue the above by AUCTION at the MART, LONDON, E.C., on TUESDAY, the 27th of JANUARY, at Two o'clock, in Lots, By ORDER of the DIRECTORS.

Particulars of Sale, with Form of Instructions for the Auctioneer or Secretary to purchase for Investors unable to attend the Auction, obtainable post free of the SECRETARY OF THE COMPANY, Mistley, ESSEX; or of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALDERSHOT GAS AND WATER COMPANY.

NEW ISSUE OF 725 £10 FIVE PER CENT. "F" PREFERENCE SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 27, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BRISTOL WATER-WORKS COMPANY.

SALE OF ORDINARY STOCK.

MESSRS. ALEXANDER, DANIEL, & CO. will SELL BY AUCTION, at the Bank Auction Mart, Corn Street, Bristol, on Thursday, the 22nd of January, 1903, at Three o'clock in the Afternoon,

£15,000

BRISTOL WATER-WORKS 7 PER CENT. MAXIMUM CONSOLIDATED ORDINARY STOCK,

in Lots of £100, at the Reserved Price of £150 for every £100 Stock.

The above £15,000 Stock is part of the 7 per cent. Maximum Consolidated Ordinary Stock, amounting to £690,000 created under the powers of the Bristol Water-Works Acts, 1888, 1889, and 1895.

The Dividend is subject to proportionate diminution whenever the Maximum Dividend to which each class of Ordinary Shares or Ordinary Stock of the Company is entitled shall not be paid in full, but such diminution may be made up in subsequent Years.

For further Particulars and Conditions of Sale, apply to the AUCTIONEERS, Bank Chambers, Corn Street, BRISTOL; to FUSSELL AND CO., Solicitors, 36, Corn Street, BRISTOL; or to

ALFRED J. ALEXANDER,
Secretary and General Manager.

Bristol Water-Works Office,
Small Street, Bristol.

Just Published, Cloth, 3s. 6d.

DOWDING'S WAGES TABLES

CALCULATED FOR

WAGES PAYABLE BY THE HOUR.

They contain in a straightforward Tabular Form every Amount which can possibly be required at Rates of from 3d. to 1s. per Hour, and from 1 to 72¾ Hours. Rising by SUCCESSIVE QUARTERS of an Hour as to Time, and by SUCCESSIVE FARTHINGS as to Money, while Farthings and Halfpennies are entirely eliminated.

Compiled by EDWIN DOWDING, *Accountant.*

KING, SELL, & OLDING, LTD., 27, Chancery Lane, W.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

THE PETROLEUM GAS SYNDICATE

Are prepared to erect complete Installations (not exceeding 2000 Lights) of their

Petrogene Carburetting Plant,

for Gas Companies, Urban Councils, Gas Engineers, &c., on Co-operative Terms. **Petroleum Gas** is equivalent in Cost of production to **Coal Gas at about 1s. 6d. per 1000 cubic feet,** and is equally suitable for Lighting, Heating, and Power purposes.

Present Lighting System not disturbed during Installation and trial.

For Particulars, apply to

C. E. MASTERMAN, Assoc.M.Inst.C.E.
28, Victoria St., Westminster, London, S.W.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for
METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.

Inquiries Solicited.

Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

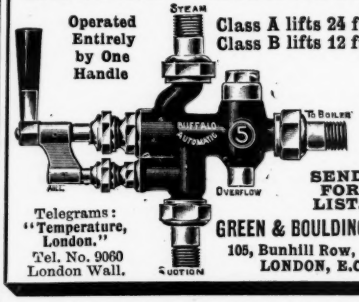
NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

'BUFFALO' INJECTOR

Operated Entirely by One Handle



Class A lifts 24 ft.
Class B lifts 12 ft.

SEND FOR LIST.

Telegrams: "Temperature, London." Tel. No. 9060 London Wall.

GREEN & BOULDING,
105, Bunhill Row, LONDON, E.C.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

Ready on Thursday. Price 5s. 6d. Post Free.

REPORTS OF DISTRICT GAS ASSOCIATIONS FOR 1902.

The publication of these Volumes commenced in 1883; and most of them are still on sale.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

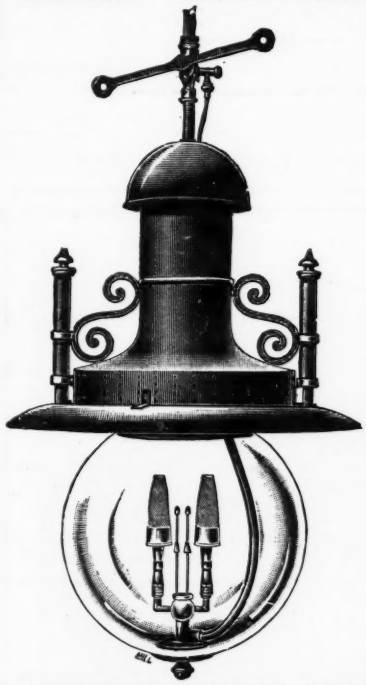
JOHN HALL & CO.,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

CRESSWELLS' ASBESTOS CO., LTD.
WELLINGTON MILLS
BRADFORD, YORKS.
Asbestos Spinners and Manufacturers.
Telephone No. 950. Tels.: "ASBESTOS, BRADFORD."

If you want a first-class **JOINTING** for High or Low Pressure **MANHOLES, MUDHOLES, STEAM-PIPES, STEAM-CHESTS, CYLINDERS, GAS-ENGINES, WATER, CHEMICAL, HOT AIR,** or **FIRE** Joints, faced or unfaced, state your wants to us. Ask for No. 2 Catalogue.
Applications for Colonial and Foreign Agencies desired.

THE PATENT
"BEACON" GLOBE LAMP.



Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

H. GREENE & SONS, Limited,
Surrey Engineering Works,
Blackfriars Road, LONDON.

LONDON OFFICE
181
QUEEN VICTORIA ST.
E. C.
DRAKES
HORIZONTAL
AND
INCLINED
RETORT SETTINGS
WITH
GENERATOR
AND
REGENERATOR
FURNACES
LIMITED
CONTRACTORS
FOR
EVERY KIND
OF
GASWORKS
PLANT.
ELEVATORS
AND
CONVEYORS
HALIFAX
AND
LEEDS

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

THE
"ROTARY"
STATION METER.
Efficiency Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
SULPHURETTED HYDROGEN
in catch position.
Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

Now Ready. Bound in Cloth. Octavo, 174 pp. Price One Guinea.

PRECEDENTS

IN

PRIVATE BILL LEGISLATION

AFFECTING

GAS AND WATER UNDERTAKINGS

1891-1901.

Compiled by EDMUND HERBERT STEVENSON, M.Inst.C.E., F.S.I., and EDWARD KYNASTON BURSTAL, M.Inst.C.E., M.I.Mech.E., F.G.S.

[The Volume for 1879-1890 is still on Sale.]

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

THE PLAISSETTY MANTLE.

This Mantle maintains its full Illuminating Power during the whole of its Life; stands vibration better than any Mantle in the world; and has a normal life of at least 2000 hours. Candle power on "C" Burner, 19 candles per cubic foot.

THE PLAISSETTY MANTLE SYNDICATE, LIMITED, *Registered Offices:* 6, Old Serjeants Inn, Chancery Lane, W.C.

THE HOUSEHOLD GAS HEATER & COOKER (PARENT) COMPANY, LTD.

(ROSS SYSTEM).

Perfect Combustion.
No Smell. Great Heat.

Recommended by the Medical Profession.

Gas Stoves,

HEATING & COOKING.

Invaluable for Sick Room. No Flues.

LIBERAL DISCOUNTS to the Trade.

THE KING OF HEATERS.

THE CONSUMPTION OF GAS UNDER ONE FARTHING AN HOUR.

For Particulars apply to the Secretary.

Telephone No. 5620 CENTRAL.

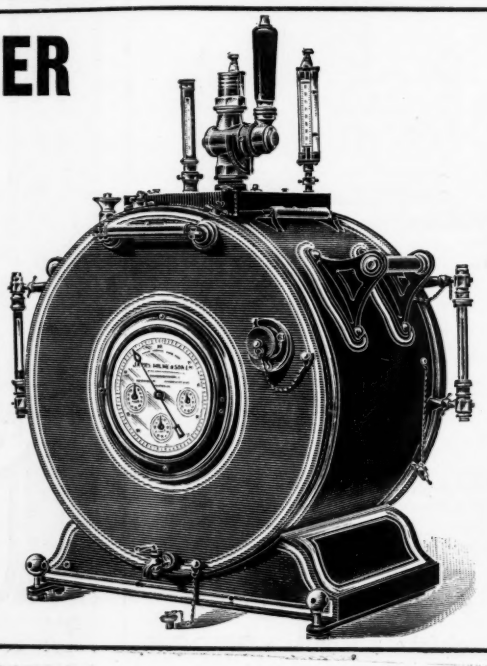
Telegrams—"GASFLAMME, LONDON."

Offices and Warehouse: 47, HOLBORN VIADUCT, LONDON, E.C.

STANDARD TEST METER

AS MADE FOR THE ADMIRALTY.

These Meters are of the Highest Finish and of the most perfect accuracy. They are supplied in fitted Wooden Cases with Pressure and Water-Line Gauges, Thermometers, Spirit-Levels, Special Overflow Water-Line and Quadrant-Cock. A complete set of Connections and Tubes, to suit all Sizes of Meters, Wet or Dry, is provided.



JAMES MILNE & SON, LTD.

EDINBURGH.

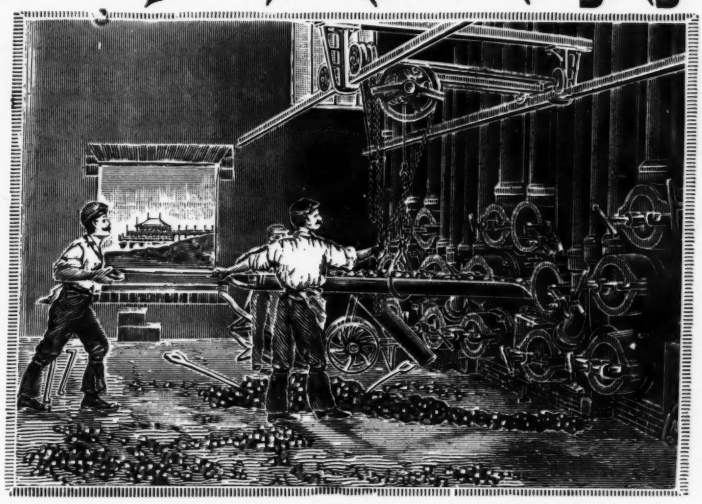
LONDON. — GLASGOW. — LEEDS.

BIGGS, WALL, & CO.,

The Patent "Rapid" Manual Charging Apparatus

Installations Completed—

Aldershot Gas Co.
Ilfracombe Gas Co.
Goole Gas Committee
Worthing Gas Co.
Dunedin Gas Co.
Newport (Mon.) Gas Co.
Shrewsbury Gas Co.
Wrexham Gas Co.
Normanton Gas Co.
Truro Gas Co.
Harlow Gas Co.
Sligo Gas Co.
&c., &c., &c.



This view shows the "Rapid" Charger at work in the Ventnor Gas-Works, I. of W.

Installations in course of Construction—

Shanghai Gas Co.
Otley Gas Co.
Epsom Gas Co.
Southbank Gas Co.
Caterham Gas Co.
Brentwood Gas Co.
Napier Gas Co.
River Plate Gas Co.
The Gt. Southern and Western Railway Company, Dublin.

REPEAT ORDERS RECEIVED—
NEWPORT (MON.) GAS CO. SOUTHBANK GAS CO. WORTHING GAS CO.

Telegrams: "RAGOUT, LONDON." Postal Address: 13, CROSS STREET, FINSBURY, LONDON, E.C.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

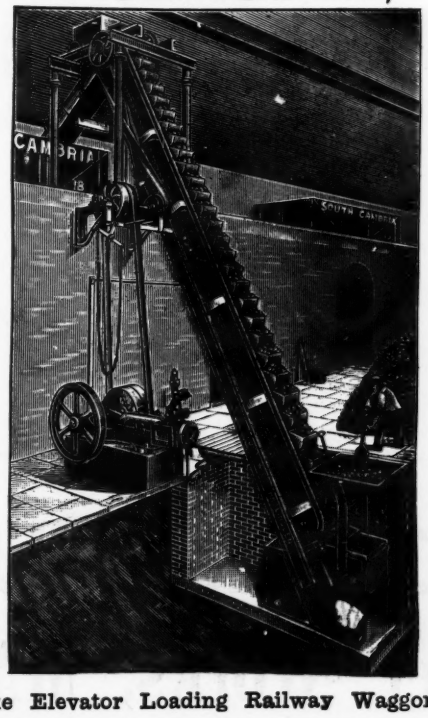
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

SAWER & PURVES'

"C.C.C."

COIN COLLECTING CONVEYANCES

WITH DETACHABLE BODY.

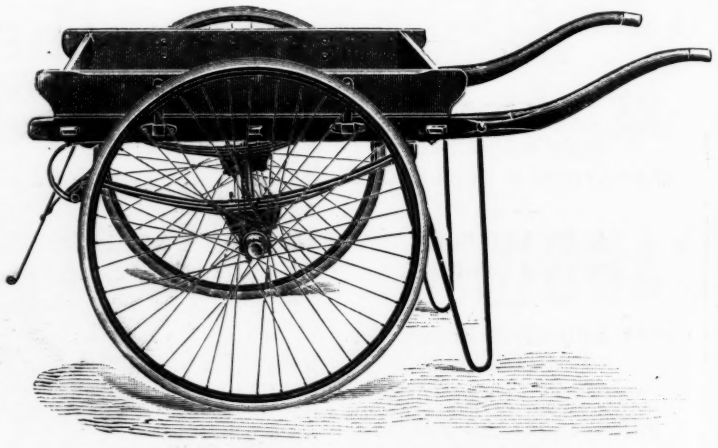
Design No. 2. With body in position.

This Conveyance is specially designed, and made to reduce the labour in the collection of Coppers, &c., from Prepayment Meters. It is strongly made, and has 28-inch wheels with ball bearings, 1¼-inch cushion tyres, and is mounted on strong springs. The lid lifts up, and is secured with best spring lock. Keys supplied to requirements.

Body of Conveyance is painted with Post Office Red, or any other colour, and is lettered in gold to order.

The Conveyances are made so that the body can be detached, and loose sides are supplied for fixing to frame, so that it can be used for the transit of small Stoves, Meters, &c., as shown in the illustration.

Price £9 net Complete.



Design No. 2. With body detached.

SAWER & PURVES,

Nelson Meter Works, MANCHESTER.

SAML. CUTLER & SONS. MILLWALL, LONDON.

GASHOLDERS OF EVERY DESCRIPTION.

CUTLER'S PATENT GUIDE FRAME FOR GASHOLDERS

Adopted for many large and important Gasholders.

CUTLER'S PATENT FREEZING PREVENTER

FOR GASHOLDER CUPS AND TANKS.

In extensive use in English, Continental, and American Works.

LARGE STEEL TANKS A SPECIALITY

Gasworks Plant of every kind.

STEEL FRAMED BUILDINGS.

RETORT-HOUSE ROOFS. BENCH IRONWORK.

CARBURETTED WATER GAS PLANT.

CUTLER'S PATENT INTERLOCKING GEARS.
CUTLER'S PATENT OIL SPRAYERS.
CUTLER'S PATENT TAR SEPARATOR.
CUTLER'S PATENT DUST INTERCEPTOR.

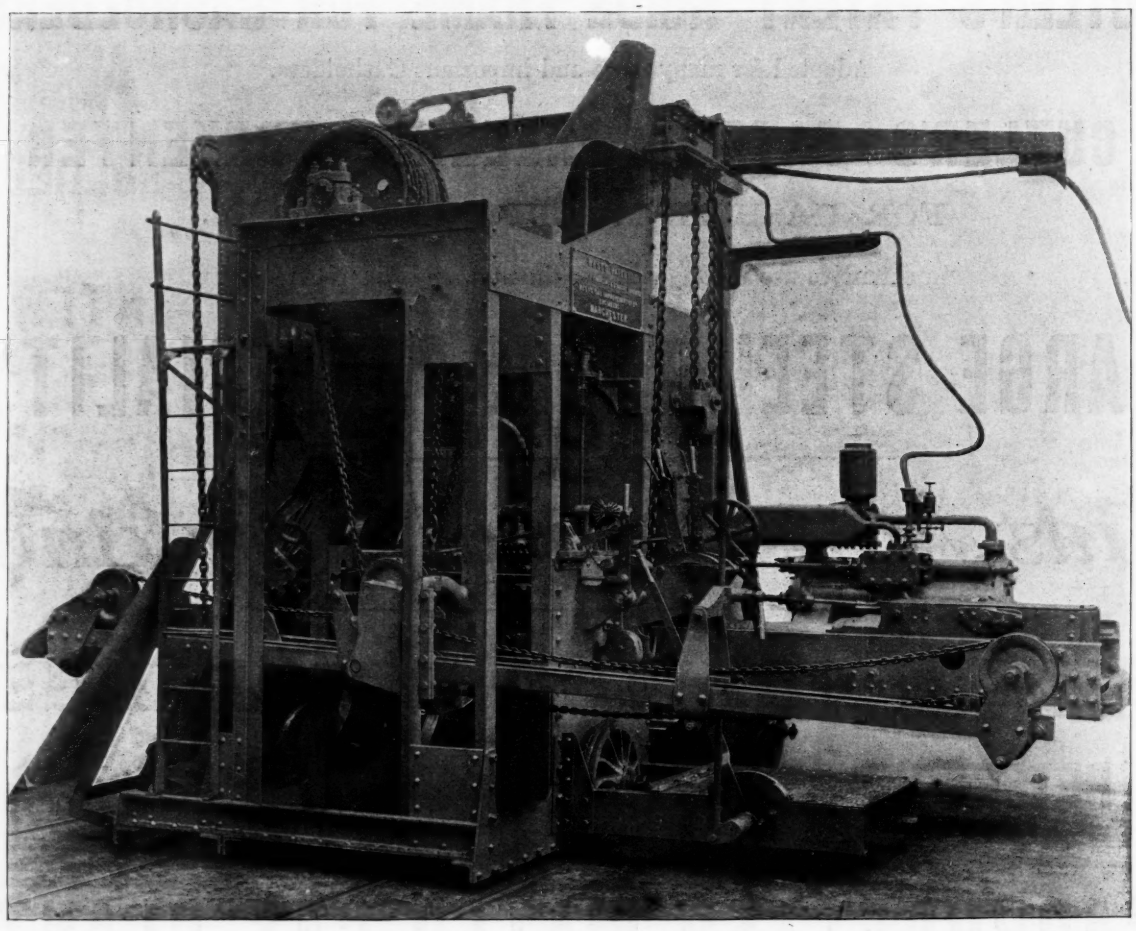
PATENT WATER TUBE CONDENSERS

OIL-TANKS. CHEMICAL PLANT.

Makers of all kinds of Constructional Ironwork.

WEST'S STOKING MACHINERY

COMPRESSED AIR DRIVEN
CHARGING AND DRAWING MACHINES;
COMBINED CHARGING AND DRAWING MACHINES; also
MANUAL CHARGING AND DRAWING MACHINES.



West's compressed Air Driven Charging and Drawing Machine, requiring only One Machine driver and one attendant to charge and draw the Retorts, attend to the Mouthpieces, and fill the Furnaces.

All classes of Coal can be efficiently dealt with by the West's Charging Machines, and the Retorts are charged evenly throughout with the full weight of Coal.

Retort Houses fitted with West's Regenerator Furnaces, Stoking Machinery, and Coke Conveyors reduce the cost of Carbonizing Coal to a minimum.

WEST'S GAS IMPROVEMENT CO., LTD.,

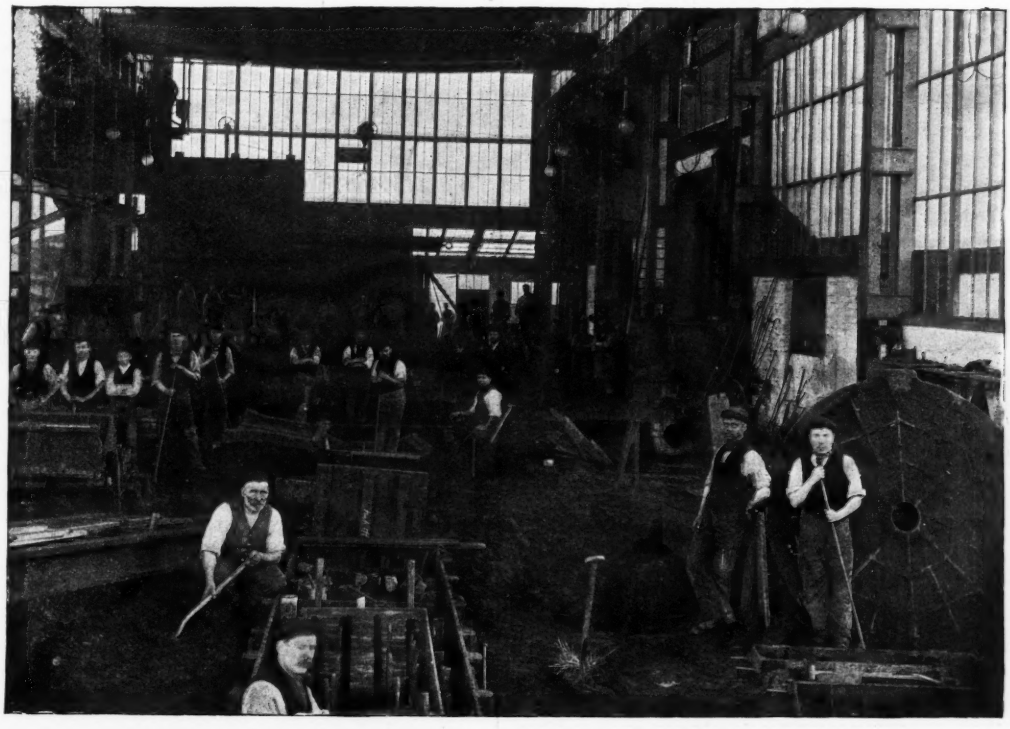
Albion Iron-Works, MILES PLATTING, MANCHESTER,

AND 104, QUEEN VICTORIA STREET, LONDON, E.C.

Manufacturers for America: RITER-CONLEY MANUFACTURING COMPANY, PITTSBURGH.

Have all your PURIFIERS

Made in the new Foundry of



ASHMORE, BENSON, PEASE, & CO.

Whose Works at Stockton-on-Tees are situated

in the Centre of the

Cheap Iron District.

Fcap. Fol., 28 *pp.*, 2 *Plates, and* 43 *Illustrations, Bound in Duplex Paper Cover, Price* 2*s.* 6*d. net, post free.*

A DESCRIPTION

OF THE

ZURICH NEW GAS-WORKS.

By A. WEISS, Engineer of the Works.

Translated from the German for, and Reprinted from, the "JOURNAL."

LONDON: WALTER KING, 11, BOLT COURT, FLEET ST., E.C.

MACBETH-EVANS GLASS CO.,

PITTSBURGH, PA.,

U.S.A.

Makers of High Grade Chimneys and Mantle Protectors for Street Lighting.

London Warehouse: 1 & 3, Old Swan Lane, E.C.

HARPER & MOORES, Limited,

STOURBRIDGE.

MANUFACTURERS OF

Inclined, Horizontal, and Segmental

GAS-RETORTS,

Fire-Bricks, Fire-Clay Lumps, and Tiles

OF EVERY DESCRIPTION.

Also Manufacturers of **Cast-Iron Retorts, Iron Mouthpieces, Pipes, and all necessaries for Gas-Works requirements.**

Telegraphic Address: "MOORES, LYE." Telephone No. 23 Lye.

JOSEPH CLIFF & SONS,

INCORPORATED IN

THE LEEDS FIRE-CLAY COMPANY, Ltd.

WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:

Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

LIVERPOOL:

16, Lightbody Street.

LEEDS:

Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas Works.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

THOMAS BUGDEN, MANUFACTURER OF

TAR and LIQUOR HOSE, and Special AIR TUBING.

BELLOWS made to inflate a 48-inch Bag under One Minute. Various sizes made.

STOKERS' MITTS. Made from best Tanned Leather.

India-rubber Hose, Sheet, and Washers of every description, Leather Bands, Oils, &c., Diving and Wading Dresses, Waterproof Coats, Capes, Sewer Boots, and Theatrical Dresses.

Fire-Engine Hose and Appliances.

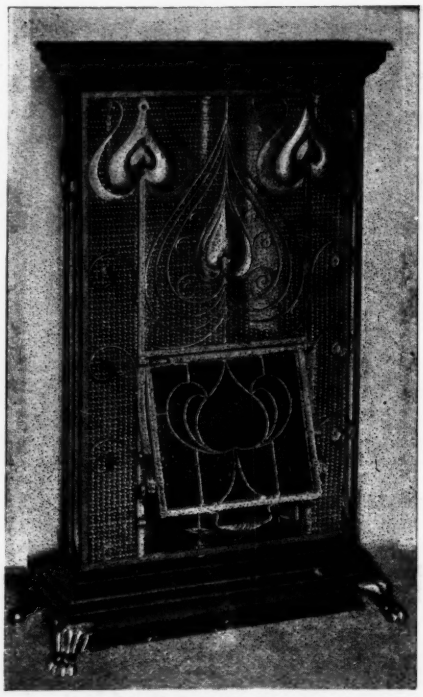
Best Materials and Workmanship Guaranteed.

Miners' Woollen Jackets No. 1, 12/- each; No. 2, 9/6.

Gas-Bags for Mains. Gas-Engine Bags.

71, GOSWELL ROAD, E.C.

THE "LUX-CALOR" TRADE MARK.



CS LUX-CALOR.

RITCHIE'S PATENT.

The "Lux Calors" were the first

CONDENSING STOVES

on the Market and, after Twenty-Five Years' experience, are still first.

Full Particulars and Prices from

RITCHIE & CO.,

Contractors for Automatic Supplies to the Gaslight and Coke Company and the South Metropolitan Gas Company.

46, Hatfield Street, Southwark, LONDON, S.E.

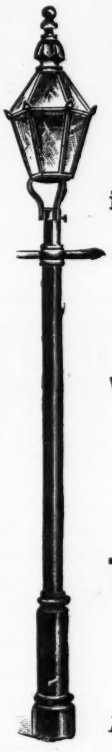
Telegrams: "WARMNESS, LONDON." *Telephone:* 1533 HOP.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
ESTABLISHED 1860.

CLAYTON SON & Co LTD
LEEDS
MAKERS OF THE
LARGEST GASHOLDER IN THE WORLD
ALSO
THE ORIGINAL MAKERS OF
SPIRAL GUIDED GASHOLDERS
MAKERS OF ALL KINDS OF
STRUCTURAL IRON & STEEL WORK. STEEL FRAMED BUILDINGS
ROOFS RETORT FITTINGS
PURIFIERS RETORT LIDS
ANTIFREEZERS for Gasholders
STEEL TANKS
OF ALL SIZES
MAKERS OF THE LARGEST IN
THE WORLD.
GASHOLDERS
OF EVERY DESCRIPTION & SIZE
HIGH CLASS BOILERS FITTED WITH DEIGHTON'S PATENT CORRUGATED FLUES.
Telegrams "GAS LEEDS." London Office 60 Queen Victoria St E.C.

MANNESMANN



LAMP POSTS
made throughout of
WELDLESS STEEL TUBING
including base, ring, and ladder rest.

Light, Strong, Unbreakable, and Cheap.

GAS, WATER & STEAM TUBES AND FITTINGS.

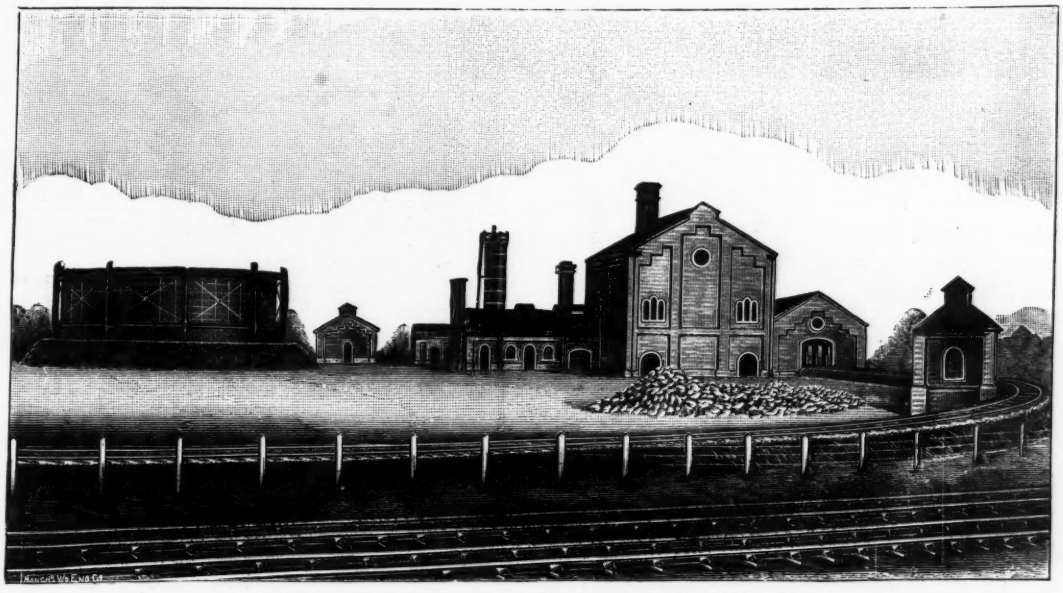
WELDLESS STEEL SPIGOT & FAUCET PIPES
for Gas and Water Mains.

Tubes can be supplied up to 10 inches diameter and in lengths up to 30 feet.

THE BRITISH MANNESMANN TUBE COMPANY, LTD.,
Landore, South Wales.
Birmingham Depôt: 110, COLMORE ROW.
London Office: 110, CANNON STREET, E.C.

R. & J. DEMPSTER, LIMITED, MANCHESTER.

Telegraphic Address: "SCRUBBER, MANCHESTER."
National Telephone Nos. 54 and 2296.



Complete New Gas-Works at Slough Erected by us in 1902.
For full Description of Works, see "JOURNAL OF GAS LIGHTING," for Nov. 18, 1902.

London Office: 165, Gresham House, Old Broad Street, E.C.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "Evans, Wolverhampton." London Address: Salisbury House, London Wall, London, E.C. National Telephone No. 7089.

Please apply for Catalogue No. 8.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

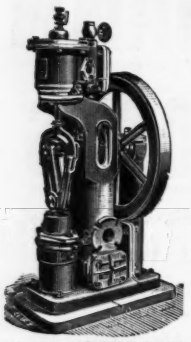


Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

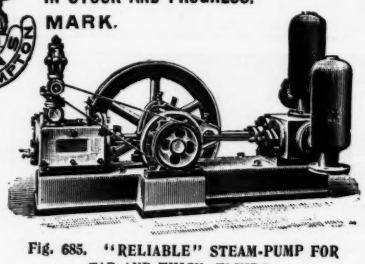


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

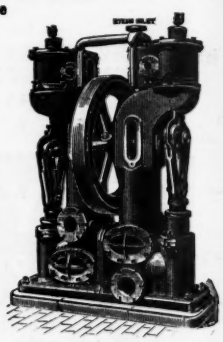


Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

MOBBERLEY & PERRY STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

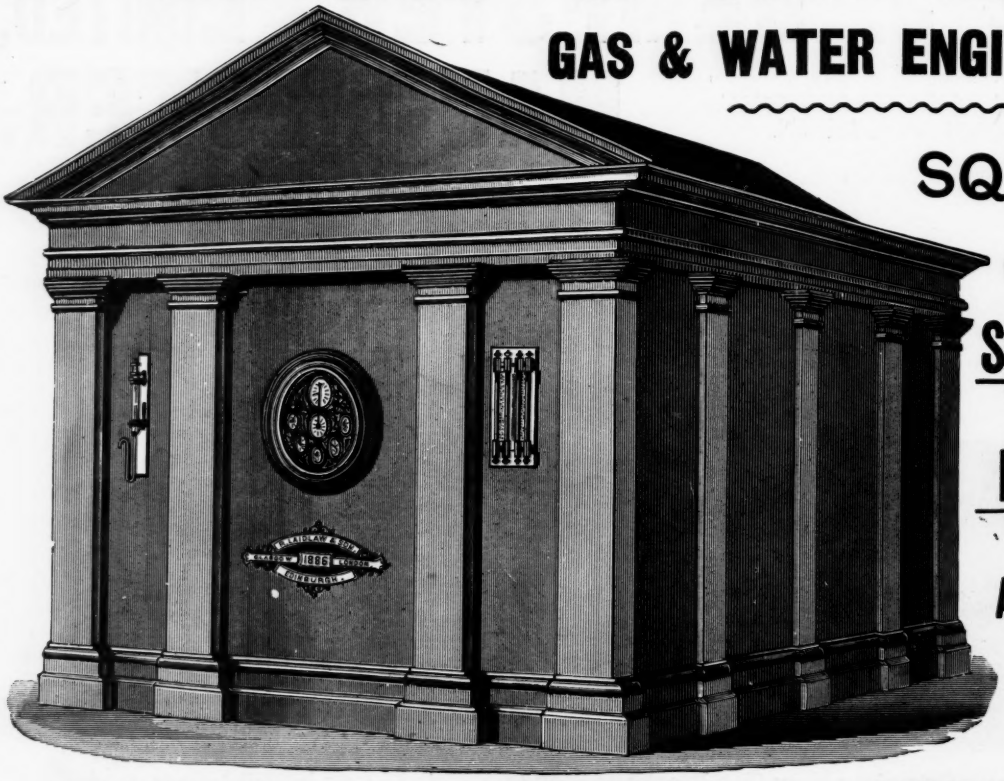
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c, &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

Contractors for the erection of Retort-Benches complete.

R. LAIDLAW & SON. LIMITED,

GAS & WATER ENGINEERS.



SQUARE (OR ROUND) STATION METERS ALL SIZES.

SIMON SQUARE WORKS, EDINBURGH. | ALLIANCE FOUNDRY, GLASGOW. | 6, LITTLE BUSH LANE, LONDON.

Printed for WALTER KING by King, Sell, & Olding, Ltd.; and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Jan. 20, 1903.